PHILIPS 420P10

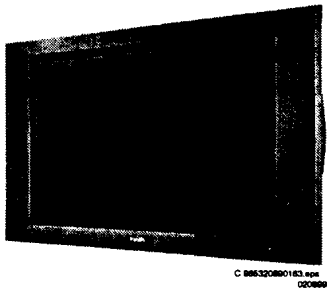
MODEL

SERVICE MANUAL

Colour Television **Display box**

FTV1.9DE
AA

Service
Service
Service



Service Manual

Contents **Page**

1. Technical specifications 2
2. Safety instructions, warnings and notes. 3
3. Directions for use 4
4. Mechanical instructions 8
5. Service modes, faultfinding and repair tips 8
6. Block diagrams
   - Fault finding trees
   - IIC bus interconnection diagram
   - Wiring diagram
   - Block diagram
   - Testpoint overview and oscillograms
7. *Electrical diagrams and PWB layouts* *Diagram PWB*
   - VsVa Supply
   - Pre-conditioner
   - Front I/O
   - LED panel
   - Audio amplifier
   - Switch panel
   - YUV/YC input
   - AV control
   - PDP limesco
8. Electrical alignments
9. Circuit description and list of abbreviations
10. Spare parts list

Copyright reserved 1999 Philips Consumer Electronics B.V. Eindhoven, The Netherlands. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.

Published by JvR9969 Service PaCE Printed in The Netherlands Subject to modification GB 3122 785 1002

PHILIPS

1. Technical specifications

1.1 Technical data D-box

Mains voltage	:	110 - 240 Vac; (- 15 %, + 10 %)
	:	50 Hz - 60 Hz
Power dissipation	:	400W
Stand-by dissipation	:	< 1W

1.2 Connection facilities

1.2.1 Specification of the terminal sockets

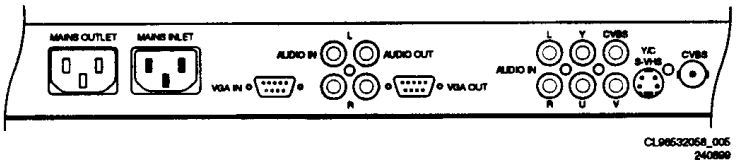


Figure 1-1

VGA-in

1 - R	(0.7 Vpp 75 Ω)
2 - G	(0.7 Vpp 75 Ω)
3 - B	(0.7 Vpp 75 Ω)
4 - Reserved	
5 - Bus-gnd	
6 - R-gnd	
7 - G-gnd	
8 - B-gnd	
9 - RC5	
10- GND	
11- CONFIG_IDENT	
12- Bus1 (TxD/ Rxd or SDA)	
13- Hsync	
14- Vsync	
15- Bus2 (TxD/ RxD or SDA)	

VGA-out

1 - R	(0.7 Vpp 75 Ω)
2 - G	(0.7 Vpp 75 Ω)
3 - B	(0.7 Vpp 75 Ω)
4 - Reserved	
5 - gnd	
6 - R-gnd	
7 - G-gnd	
8 - B-gnd	
9 - Reserved	
10- GND	
11- Reserved	
12- Reserved	
13- Hsync	
14- Vsync	
15- Reserved	

Audio VGA-in

- Cinch Audio	L(0.5 Vrms >= 10 k)
- Cinch Audio	R(0.5 Vrms >= 10 kΩ)

Audio VGA-out

- Cinch Audio	L(0.5 Vrms >= 1 k)
- Cinch Audio	R(0.5 Vrms >= 1 kΩ)

SVHS

1 - GND	
2 - GND	
3 - Y	(1 Vpp / 75)
4 - C	(0.3 Vpp / 75)

Audio_in:

- Cinch Audio	L (0.5 Vrms >= 10 k)
- Cinch Audio	R (0.5 Vrms >= 10 kΩ)

CVBS

- BNC - CVBS	(1 Vpp / 75 Ω)

YUV

- Y	(1 Vpp / 75)
3 - U	(1 Vpp / 75)
4 - V	(1 Vpp / 75)

1.3 Chassis overview

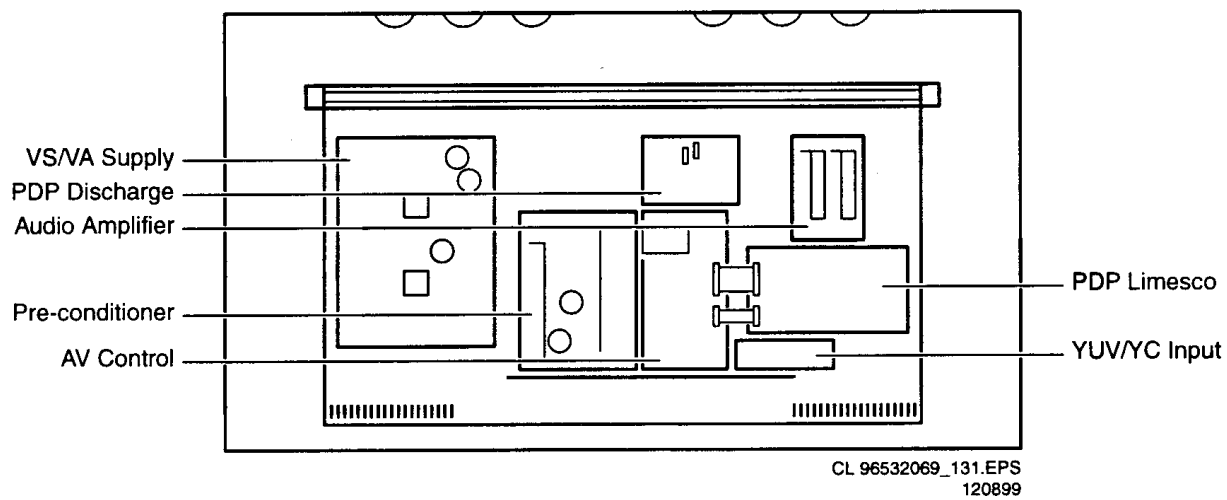


Figure 1-2

2. Safety instructions, warnings and notes

2.1 Safety instructions ⚠

It is not allowed to operate the FTV-set without glass plate. One function of this glass plate is to absorb Infrared Radiation. Without this glass plate the level of Infrared Radiation produced by the plasma display could damage your eyes.

1. Safety regulations require that during a repair:
   - the set should be connected to the mains via an isolating transformer (in this particular case a transformer of ≥ 800 VA);
   - safety components, indicated by the symbol ⚠ , should be replaced by components identical to the original ones;
2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.
   - Note: The wire trees should be routed correctly and fixed with the mounted cable clamps.
   - The insulation of the mains lead should be checked for external damage.
   - The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets that have a mains isolated power supply). This check can be done as follows:
     - unplug the mains cord and connect a wire between the two pins of the mains plug;
     - set the mains switch to the on position (keep the mains cord unplugged!);
     - measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ;
     - switch off the TV and remove the wire between the two pins of the mains plug.
   - The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

2.2 Warnings

1. ESD

All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.

1. Available ESD protection equipment:
   - complete kit ESD3 (combining all 6 prior products - small table mat) 4822 310 10671
   - wristband tester 4822 344 13999
2. Never replace modules or other components while the unit is switched on.
3. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.3 Notes

1. A glass plate is positioned before the plasma display. This glass plate can be cleaned with a slightly humid cloth. If due to circumstances there is some dirt between the glass plate and the plasma display panel it is recommended to do some maintenance by a qualified service employee only.
2. Never disconnect the power display cable when the set is operating
3. With DST no failures (error-codes) can be red, when the set is in Service-mode.
4. If DST reacts with 'error 2', there is no communication between set and DST. Note that IR-transmitter LED is positioned at right side of IR-receiver eye of the E-box. Take into account that receiver-LED on DST is positioned not in the middle but at the left side. Point corresponding LED's to each other. In case the amount of Infrared produced by the screen pollutes the communication, the set can be set in Standby-mode. Then still the error-messages can be retrieved.

4. Mechanical instructions

4.1 Introduction:

There are pre-defined service positions for the following panels:

1. VS/VA SUPPLY panel.
2. PDP DISCHARGE panel.
3. AUDIO AMPLIFIER panel.
4. PRE-CONDITIONER panel.
5. AV CONTROL panel.
6. PDP LIMESCO panel.
7. YUV/YC INPUT panel.
8. LED DISPLAY panel.
9. SWITCH DISPLAY panel.

Before these panels can be accessed, the rear cover has to be removed:

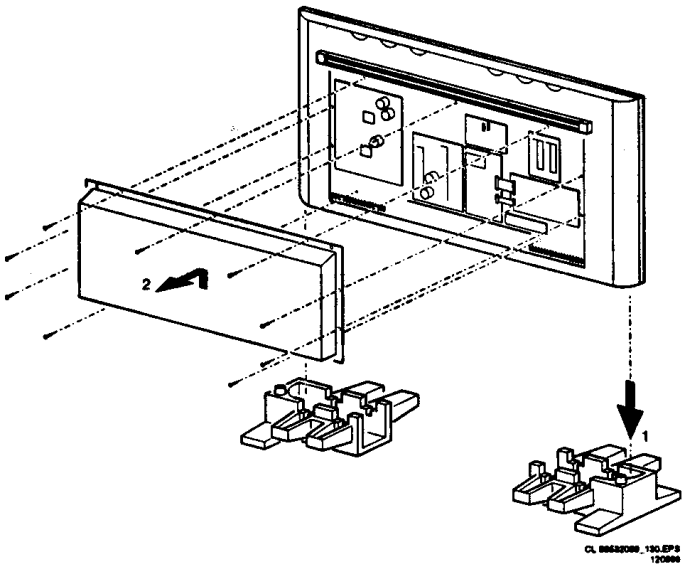


Figure 4-1

1. Place the Display Box in the service stand via 2 reinforced cushions (order code: 3122 126 ?????).
2. Remove the 9 fixation screws of the rear cover.
3. Remove the rear cover (during removal push it slightly upwards).

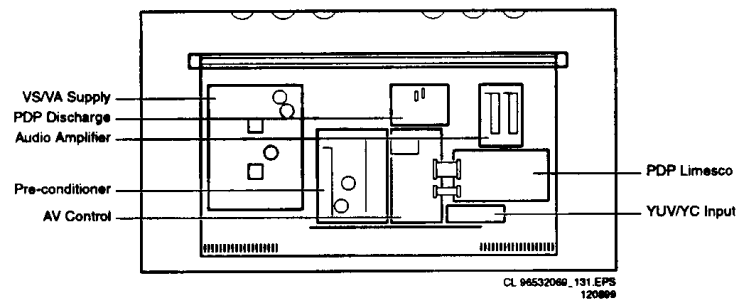


Figure 4-2

1. All panels are now accessible.

4.1.1 VS/VA SUPPLY panel.

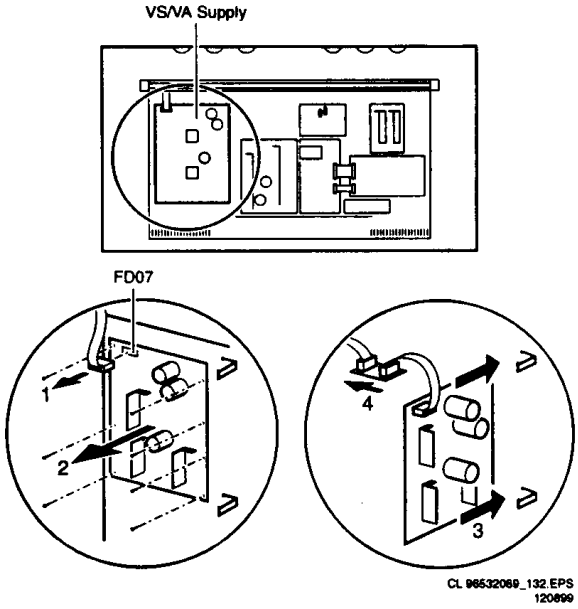


Figure 4-3

1. Disconnect Fan Supply cable from connector FD07 in the upper left corner [1].
2. Remove the 7 fixation screws of the panel [2].
3. Place panel on the 2 hinges, which are located near the right corners of the panel [3].
4. Use the mechanical service part (extension cable assembly, 12NC: 3122 785 90006) to extend the Fan Supply cable [4].
5. The copper side is now accessible from the left.

4.1.2 PDP DISCHARGE panel.

As in the FTV 1.5, this panel must be exchanged completely i defective.

4.1.3 AUDIO AMPLIFIER panel.

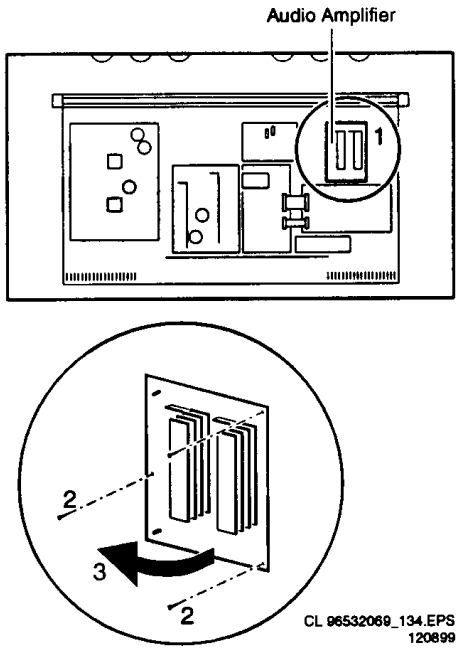


Figure 4-4

1. Some testpoints are accessible at the B-side [1].
2. If this is not sufficient, remove the 3 fixation screws of the panel [2].
3. Panel now can be hinged on the left side to access the A-side (soldering side) [3].

4.1.4 PRECONDITIONER panel.

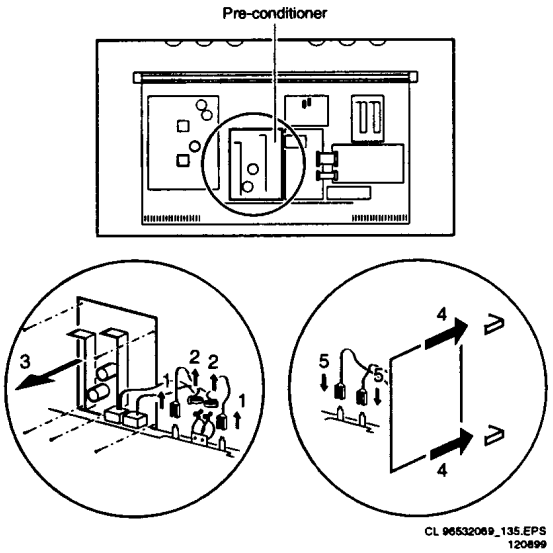


Figure 4-5

1. Disconnect the 2 grounding wires from the shielding plate by pressing the small lever on the connector while pulling [1].
2. Remove the 2 ferrite ring cores from their fixations [2].
3. Remove the 5 fixation screws of the panel [3].
4. Place panel on the 2 hinges, which are located, near the left corners of the panel [4].
5. Reconnect grounding wires to the extra connectors on the shielding plate at the left side [5].
6. The copperside becomes accessible now from the right side.

4.1.5 AUDIO VIDEO CONTROL panel.

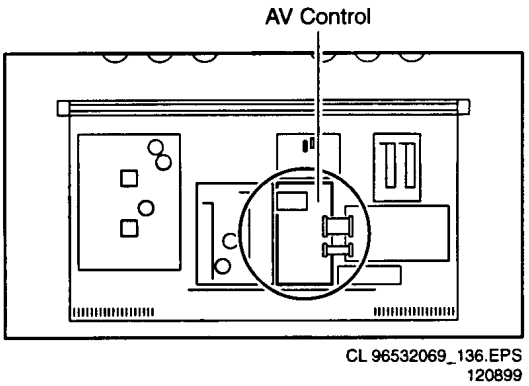


Figure 4-6

This panel has no service position for accessing the A-side, however all service test points are accessible at the B-side (see Service Manual).
In case some components must be (de)soldered, all fixation screws (6 for the panel, 5 at the metal connector plate) and all cables must be removed to access the A-side.

4.1.6 PDP LIMESCO panel.

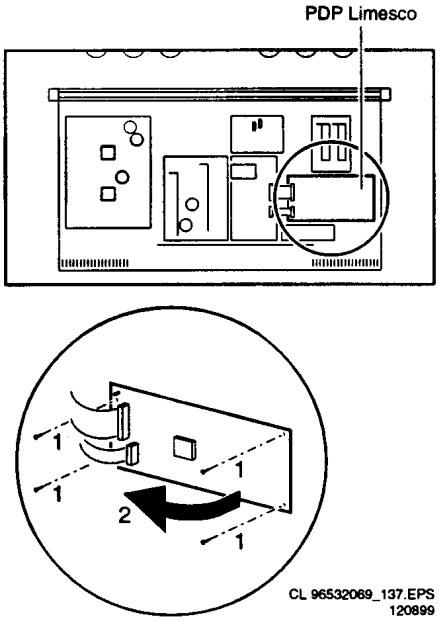


Figure 4-7

All SMC's are located on the B-side, so all testpoints are accessible. In case some components must be (de)soldered, the hinge construction can be used to access the A-side.
1. Remove the 4 fixation screws of the panel [1].
2. Panel can now be hinged to access soldering side [2].

4.1.7 YUV/YC INPUT panel.

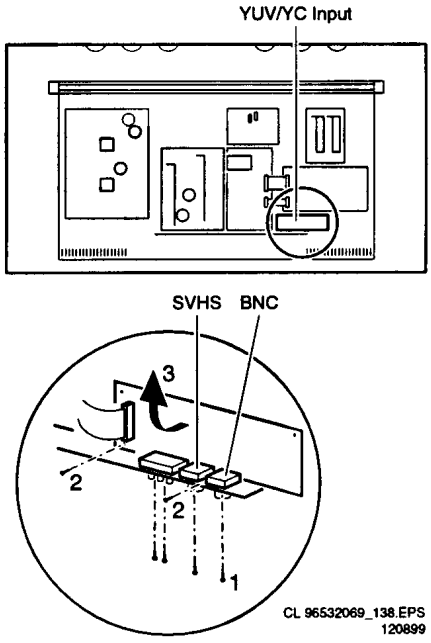


Figure 4-8

This panel has no pre-defined service position. For access of the A-side, the panel has to be removed:
1. Remove the 4 screws at the metal connector plate [1].
2. Remove the 2 fixation screws of the panel [2].
3. Panel can be removed now to access the A-side [3].

4.1.8 LED DISPLAY panel.

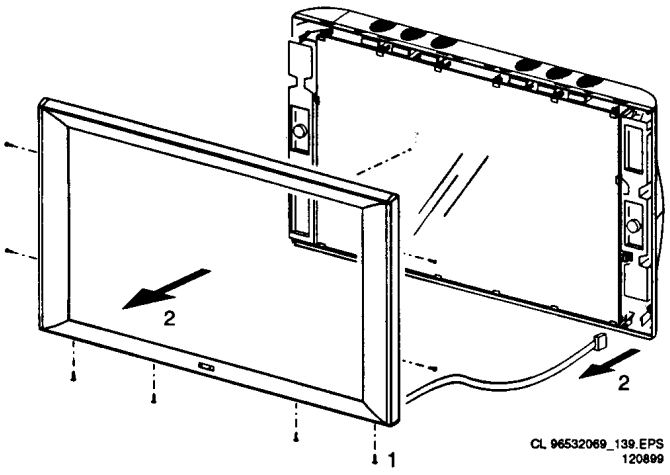


Figure 4-9

1. Remove 2 x 2 screws at the sides and 4 screws at the bottom of the front cover [1].
2. Remove the front cover (it hinges at the top). During removal unplug the cable of the LED DISPLAY panel at the SWITCH DISPLAY panel (connector SD11) [2].

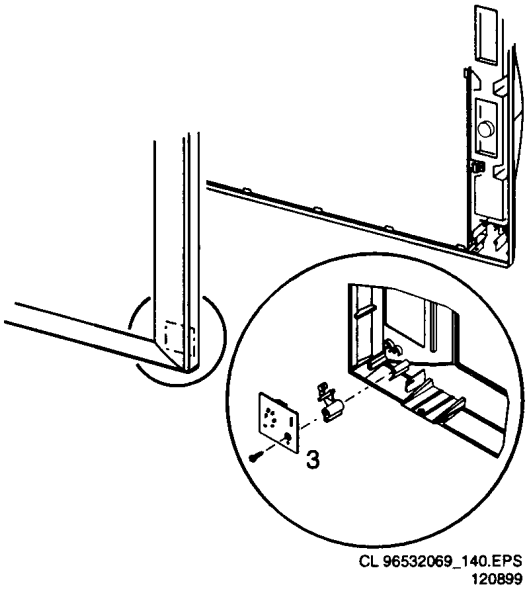


Figure 4-10

1. The LED DISPLAY panel can be removed now by unscrewing 1 fixation screw [3].

4.1.9 SWITCH DISPLAY panel.

1. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

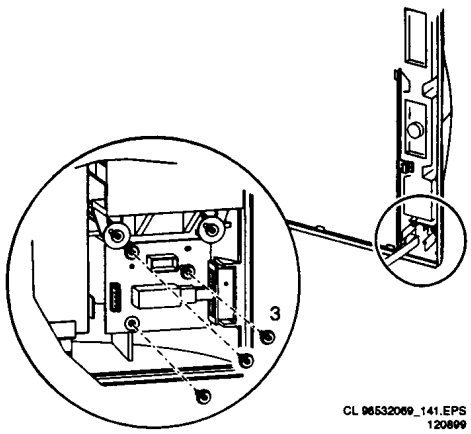


Figure 4-11

1. The SWITCH DISPLAY panel can be removed now by unscrewing 3 fixation screws [3].

4.2 Exchanging parts

Some parts of the FTV1.9 Display Box must be exchanged if defective:

1. GLASS PLATE.
2. LOUDSPEAKER.
3. PLASMA DISPLAY PANEL [PDP].

4.2.1 Exchanging of the GLASS PLATE.

1. First unplug (remove Mains and VGA cable) the Display Box .
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

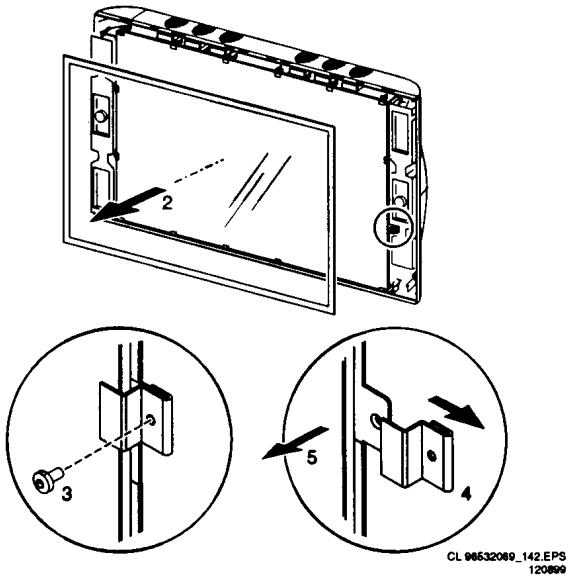


Figure 4-12

1. Now the GLASS PLATE can be removed by unscrewing a screws [3] and removing all glass clips [4].

4.2.2 Exchanging of a LOUDSPEAKER.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

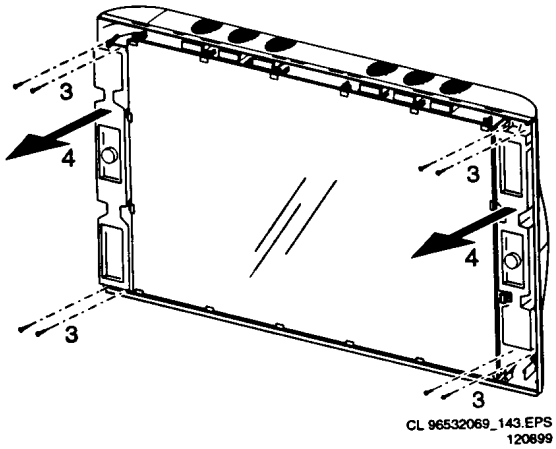


Figure 4-13

1. The LOUDSPEAKER can now be removed by disconnecting its cable and removing the 4 fixation screws at the top and bottom of the speakerbox. Be sure to remove the correct screws, otherwise the speaker system will be damaged (it is an airtight system).

4.2.3 Exchanging of the PDP.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Place the rear side of the Display Box on a foam cushion (be sure the metal rear cover is mounted in order to prevent damaging of the electronic panels).
3. Remove front cover (for a description see Chapter 1.1.8 LED DISPLAY panel).
4. Now the GLASS PLATE can be removed by unscrewing all screws and removing all glass clips (for a description see Chapter 1.2.1. 'Exchanging of the GLASS PLATE').

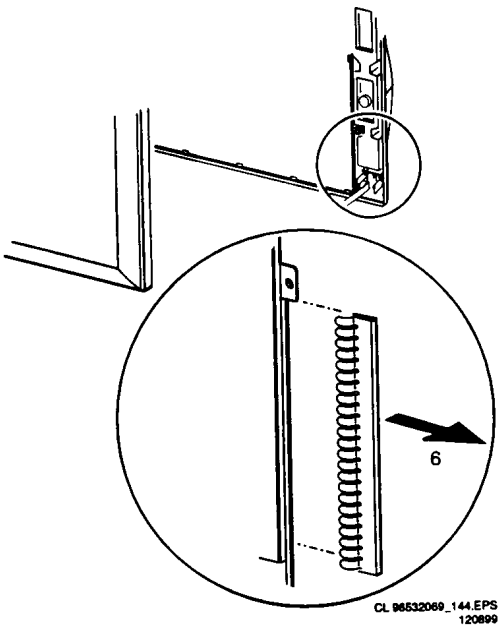


Figure 4-14

1. Remove all copper EMC SHIELDING springs mounted around the display [6].
2. Now flip the complete Display Box and place it with the Plasma Display down on a foam cushion. Be 100 % sure a large foam cushion is placed underneath the PDP, as it will drop about 10 mm after removing its fixation screws ! !
3. Disassemble metal rear cover (for a description see Chapter 1.1 'Introduction').

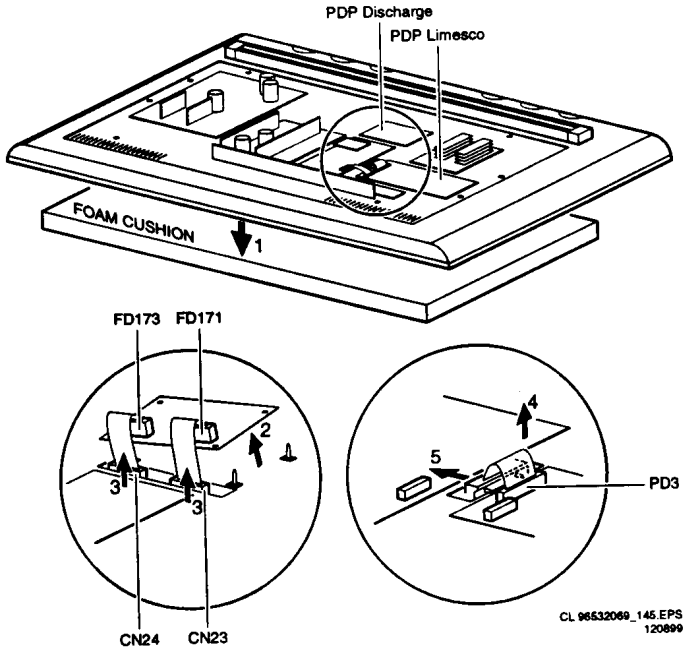


Figure 4-15

1. Disconnect the following cables:
   - Cables coming from connectors CN23 and CN24 of the PDP DISPLAY panel [3] (for easiest access lift the PDP DISCHARGE panel from its fixations [2]).
   - Flat cable on connector PD3 of the PDP LIMESCO panel [4]. Also remove the ferrite 'flat cable shield' completely by unlocking its fixations [5].

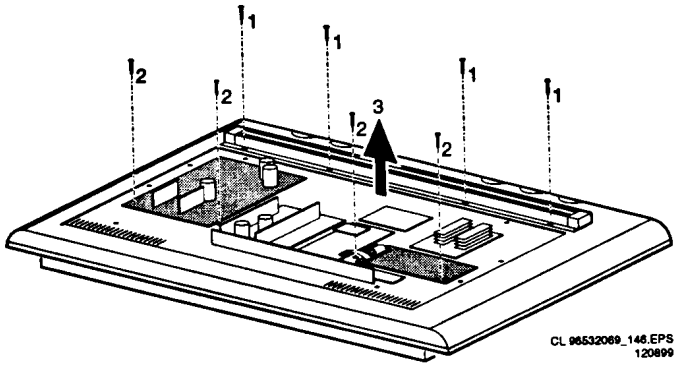


Figure 4-16

1. Now remove the 8 large screws which hold the PDP:
   - 4 screws are located at the top: they also hold the aluminium wall mount [1].
   - The other 4 are located at the bottom: the 2 outer screws are hidden behind panels. Therefor unscrew the VS/VA SUPPLY and the PDP-LIMESCO panel (grey panels) [2].
2. Lift encasing from PDP and replace PDP [3].

5. Service modes, fault finding and repair tips

For the FTV1.9, the Monitor can be used in two applications.
- A stand-alone configuration, a separate device which can also be sold and serviced separately.
- TV configuration, where the monitor is combined with the E-box.

The monitor, as a stand-alone unit, can be serviced by using a test pattern coming from the PDP-LIMESCO panel on the rear of the monitor itself or via a PC/laptop by using ComPair via the ComPair connector.
In this chapter the following paragraphs are included:
1. Test points
2. Dealer Service Tool (DST)
3. Service Modes
4. Error code buffer and error codes
5. The "blinking LED" procedure
6. Fault-finding tips
7. ComPair

5.1 Test points

The FTV1.9 chassis is equipped with test points in the service printing. These test points are referring to the functional blocks:
- A1-A2-A3, etc.: Test points for the Audio amplifier (A)
- C1-C2-C3, etc.: Test points for the AV control circuit (AVC)
- FD1-FD2-FD3, etc.: Test points for the VsVa supply (FD1-FD2) and the PDP discharge panel
- L1-L2-L3, etc.: Test points for the PDP LIMESCO (PD1-PD9)
- PR1-PR2-PR3, etc.: Test points for the Pre-conditioner (PR1-PR3)
- Y1-Y2-Y3, etc: Test points for the Y/C YUV monitor panel (UY1-YC4)

Measurements are performed under the following conditions:
Video: colour bar signal; Audio: 3 kHz left, 1 kHz right

5.2 Dealer Service Tool (DST)

For easy installation and diagnosis the dealer service tool (DST) RC7150 can be used. When there is no picture (to access the error code buffer via the OSD), DST can enable the functionality of displaying the contents of the entire error code buffer via the blinking LED procedure, see also paragraph 5.5. The ordering number of the DST (RC7150) is 4822 218 21232.

5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with pre-sets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I (DST interface; ordering code 4822 218 21277). For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the FTV1.9 chassis, download code X should be used).

5.2.2 Diagnose features for service

FTV1.9 sets can be put in two service modes via the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM).

5.3 Service Modes

Below described sequence is only valid for the "Monitor Only Configuration". When a Receiver box is connected to the Display Box (TV Configuration), please check chapter 5 in the Training Manual of the Receiver Box.

5.3.1 Service Default Mode (SDM)

The purpose of the SDM is:
- Provide a situation with predefined settings to get the same measurements as in this manual.
- Access to the error buffer via the blinking LED procedure
- Inspect the error buffer.
- Possibility to overrule software protections via the service pins (caution: override of software protections!).

Entering the SDM:
- By transmitting the "DEFAULT" command with the RC715(Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM).
- By pressing on a standard RC the following sequence 0, 6 2, 5, 9, 6 followed by the "MENU" key.
- By short-circuiting the SDM pin on the AVC panel (see TM Display Box chapter 7).

In the SDM the following information is displayed on the screen:

F19DBC X.Y_12345 (1) LLLL (2) SDM (3)
ERR 02 01 44 ## ## ## ## ## ## ##

Explanation notes/references:
(1) Software identification of the main micro controller (F19DBC X.Y_12345)
- F19D is the chassis name for FTV1.9 display
- B is the region identification
- C is the language cluster
- X = (main version number)
- Y = (subversion number)
- ##### are the last 5 digits of the 12nc number

(2) "LLLL" Normal display operation in hours
(3) "SDM" To indicate that the TV set is in the service defaul mode
(4) "ERR 02 01 44 ## ## ## ## ## ## ## ##" This line show the contents of the error buffer (max. 10 errors). The last erro that occurred is displayed at the most left position. When les then 10 errors have occurred the rest of the line is empty. Whe the errorlist is empty " No errors" is displayed. No duplicate errors.
Exit the SDM:
Push the "MENU" button on the Remote Control.
The SDM sets the following pre-defined conditions:
- Volume level is set to 25% (of the maximum volume leve
- Linear Audio and Video settings are set to 50%.
- Colour temperature is set to normal.

The following functions are "overruled" in SDM since they interfere with diagnosing/repairing a set
- Video blanking.
- Slow demute.
- Anti-ageing.
- Automatic switch to "Standby" when H- and/or V-sync signals are lost.

All other controls operate normally.

5.3.2 Service Alignment Mode (SAM)

The purpose of the SAM is to align and or adjust settings.
For recognition of the SAM, "SAM" is displayed at the top of th right side of the screen
Entering the SAM-menu:
- By pressing the "ALIGN" button on the RC7150 Dealer Service Tool followed by code 3140 and the "OK" buttor
- Standard RC sequence 062596 followed by the "OSD" button.

- By short-circuiting the SAM pin on the AVC panel (Caution: override of software protections ! !)

In the SAM the following information is displayed on the screen:

F19DBC X.Y_12345 SAM
ERROR## ## ## ## ##
WHITE POINT
PDP TEST PATTERN [ON/OFF]
STORE
RESET ERROR BUFFER

The menus and submenus

White point
The white point sub menu contains the following items:
- RED
- GREEN
- BLUE
- COLOUR TEMPERATURE

PDP Test pattern
By selecting this item, all OSD disappears from the screen. The screen now changes from light grey to dark grey in a slow regular rhythm. One can so easily check if all pixels of the monitor are correct.

Store
The change values are stored in the NVM.

Reset Error Buffer
This option will reset the error buffer.

Exit the SAM:
Push the "MENU" button on the Remote Control.
SAM menu control:
Menu items can be selected with the "UP" or "DOWN" key. Entry into the selected items (sub menus) is done by the "LEFT" or "RIGHT" key. The selected item will be highlighted. With the same "LEFT/RIGHT" keys, it is possible to increase/ decrease the value of the selected item.
Return to the former screen by pushing the "MENU" button.
The item values are stored in NVM if the sub menu is left.

5.3.3 Customer Service Mode (CSM) Display

FTV1.9 monitors are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and de-activated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible.
Entering the Customer Service Mode.
- By pressing on RC03333/01 the following sequence : Picture, sound, cursor up, cursor down, cursor left, cursor right followed by the button (MUTE)
- RC7150 (DST) or a standard RC by pressing the sequence 062596 followed by the button (MUTE)

Exit the Customer Service Mode.
- pressing the "MENU" or any key on the Remote Control handset (except "P+" or "P-")
- switching off the TV set with the mains switch.

All settings that were changed at activation of CSM are set back to the initial values

The Customer Service Mode information screen
The following information is displayed on screen:

CUSTOMER SERVICE MENU
- Software version F19DBC X.Y_#####)
- Code 1: contains the last 5 error codes
- Code 2: contains the first 5 error codes with the last received error at the most left-hand side.
- Service unfriendly modes

5.4 Error code buffer and error-codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right.
In case of non-intermittent faults, clear the error buffer before starting the repair to prevent that "old" error codes are present.
If possible check the entire content of the error buffers. In some situations an error code is only the RESULT of another error code (and not the actual cause).
Note: a fault in the protection detection circuitry can also lead to a protection
The error code buffer will be cleared in the following cases:
- exiting SDM or SAM with the "Standby" command on the remote control
- transmitting the commands "EXIT" with the DST (RC7150)
- transmitting the commands "DIAGNOSE-9-9-OK" with the DST.

The error buffer is not reset by leaving SDM or SAM with the mains switch.
Examples:
ERROR: 0 0 0 0 0 : No errors detected
ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
ERROR: 5 6 0 0 0 : Error code 6 was first detected and error code 5 is the last detected (newest) error

Error-nr	Type of Error	Possible defect/cause
1	+5V	+5V pin at mP is low.
2	8V6	8V6 pin at mP is low
3	Fan_prot	Gives an indication that 1 or more FAN(s) does not function, or that 1 or more fan control circuits is defect
4	Over-temp_prot	Temperature at the heatsink of the VsVa supply or the Preconditioner is too high
5	DC_prot	Audio-amplifier IC, its supply or the Audio amplifier is defect
6	Over_voltage_prot	Vs or Va supply voltage is too high
7	Vrr	Powersupply of the display is not correct. Ignorance of the signal during startup by the software.
8	Power_OKE	Power supply or modules that uses this voltage. If this signal is NOT activated means that all supply voltages are available (exception Audio supply)
9	Blocked NVM IIC bus	NVM IIC bus is correct
10	Blocked slow IIC bus	Slow IIC bus is correct
11	TDA9860	No acknowledge of Audio controller
12	TDA4885	No acknowledge of Video controller
13	MC141585	No acknowledge of OSD Generator
14	uPD93687GD-LBD	No acknowledge of Limesco
15	PCF8574AT	No acknowledge of I/O Expander

Error-nr	Type of Error	Possible defect/cause
16	NVM	No acknowledge of NVM
17	Communication	Fault in the communication

5.5 The "blinking LED" procedure

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. There are two methods:

- When the SDM is entered, the LED will blink the number of times, equal to the value of the last (newest) error code (repeatedly).
- With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 5 (the first error). The LED will operate in the same way as in the previous point, but now for the error code on position x.

Example:
Error code position1 2 3 4 5
Error buffer:8 9 5 0 0

- after entering SDM: blink (8x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 2- OK" with the DST: blink (9x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 3- OK" with the DST: blink (5x) - pause - blink (5x) - etc.
- after transmitting "DIAGNOSE- 4- OK" with the DST: nothing happens

5.6 Fault finding tips

5.6.1 Pre-conditioner

The Pre-conditioner delivers the following output voltages:

- 5 VSTBY
- 5 VSTBY_switched
- 380 VDC
- Internal 12 VSTBY to supply the relay, which switches the mains input

To trouble shoot the pre-conditioner, first check the LED of the display-box.

- No red, green or orange LED indicates the absence of the +5Vstby_switched at the VsVa panel.

Check the +5Vstby_switched on pin 5 of connector PR08. If this voltage is present check the presence of this voltage at the VsVa-panel on pin 2 of connector FD04. See the wiring diagram of the monitor for more details.
If the voltage is not present, check R3508 and fuse 1500. In case of a defective R3508, check/replace item 7500, opto-coupler 7501, regulator 7502, and diode 6501 + 6502.
In case of an open circuit of fuse 1500, check/replace bridge 6500 and capacitor C2501.
If both component are alive, measure the voltage at pin 5 of IC7500 - Topswitch. If the waveforms resembles a burst-signal, the output is too heavy loaded. Check the output diode D6504 and capacitor C2508 of the 12VSB and diode 6505 and capacitor C2510 of the 5VSTBY.

- The red LED is blinking (+5Vstby is OK!), which is an indication of a protection.

Disconnect the VGA-cable between the E-box and the Monitor. Now the Monitor is operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.
Automatically the orange coloured LED of the monitor will blink the content of the error-buffer. If the sequence contains error-code 8, the cause could be a defective pre-conditioner. Error-code 8 is an indication that the +5V and/or the Vs/Va of the VsVa supply are not correct.
In case of error-code 4, switch OFF the set and check the temperature of the heatsink. In case of a high temperature of the heatsink, check MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.
In case of error-code 8, remove connector PR09 from the board. Short-circuit pin 2 of T7681 to ground, simulation of "SUPPLY_ON". (Caution - Protections overruled!!!)
Measure voltage at C2616. Is voltage 380Vdc?
Yes, the cause was a too heavy load/short-circuit at the VsVa panel.
No, measure the voltage at C2606/C2607. Is this voltage a DC voltage of approx. 300V with a strong ripple at a mains-input of 230Vac? If NO, check if relay 5690 is activated via the transistors T7684 + T7690. Check also PTC's 3600, 3601 and 3602 at their resistor-value.
Voltage is present at C2606. Check/replace NFR 3663 and 3668, if one of them is an open-circuit. In case R3663 is an open circuit, check/replace diode 6660, 6661 and capacitor C2664 plus IC 7660. If IC7660 is defect, check/replace IC 765(and C2262. In case of an open circuit of NFR 3668, replace IC 7650.
NFR 3663 and NFR 3668 are not defect. Measure waveform a base of T7608. Is a square waveform present at gate of T7610?
Check/replace MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.

5.6.2 VsVa-supply

The red LED is blinking (+5Vstby is OK!), which is an indicatior of a protection.
Disconnect the VGA-cable between the E-box and the Monitor The Monitor is now operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.

- Error-code 1, check the +5V supply

Check fuse 1103. If the fuse is an open circuit, check/replace IC 7201. If fuse 1103 is OK, check the presence of the 17V. I this voltage is not present check fuse 1102 + 1104 and D6121 + D6122. If the 17V is present, then remove connector FD05. The reason could be a too heavy load or a short-circuit of the +5V supply. If after disconnection of connector FD05 the set still goes into protection, check D6203, NFR 3205 and the circuit around IC 7201.

- Error-code 2, check the 8V6 supply

Check regulator IC 7203, NFR 3099 and D6204.

- Error-code 8 there is something wrong with the POWER_OKE signal. When the POWER_OKE signal is low, the Vs and Va and the +5V are available.

Measure the voltage Va at C2120. Is the voltage between 55\ and 65V? If not check fuse 1105 and D6120. If both components are OK, the cause could be a too heavy load.
Measure the voltage Vs at C2020. Is the voltage between 165\ and 185V? If not check D6020. If D6020 is OK, the cause coul be a too heavy load.
If both voltage are not present, check fuse 1004 at the input.
If fuse 1004 is an open circuit, check the MOSFET's 7005 an 7006 for a short-circuit. In case of short-circuit use the repair-kit.
If fuse 1004 is OK, check the voltage at pin 15 of IC 7001. Is th voltage at pin 15 approx. 16-17V? If NO, check NFR 3002 an D6002 + D6030. If YES, check the waveforms FD49 and FD5(at pin 14 and 12. If they are present, check pulse transforme 5001 and the driver-circuits around MOSFET 7005 and 7006
If the waveforms FD49 and FD50 are not present, replace IC7001.

- Error-code 5, check the audio-supply or the Audio amplifie IC.

Check/replace fuse 1201 + 1202 and diode 6201 + 6202. If th components are OK, check the audio-amplifier IC.

- Error-code 6, check the Vs and/or the Va supply voltage.

The regulation-circuit of one of these voltages is not working correctly.
For the Va supply check opto-coupler 7102 and IC 7110.
For the Vs supply check opto-coupler 7002 and IC 7010

5.7 ComPair

5.7.1 ComPair mode

The monitor, as a stand-alone unit, can be diagnosed via a PC/ laptop by using ComPair via the ComPair connector. Before connecting the ComPair-cable at the AV Control panel on connector AVC34, the monitor must be put in the "ComPair - Mode ". This can be done by changing the jumpers at connector AVC39. Connector AVC39 is situated close to the up panel.
The figure below shows how to do it.

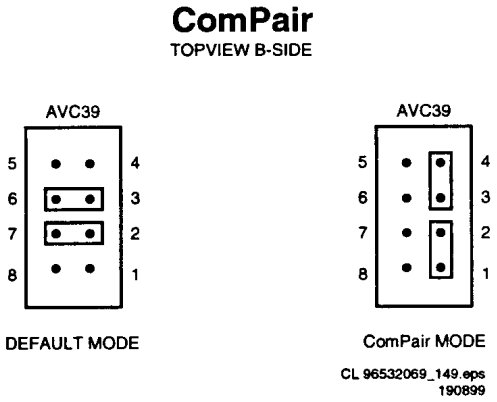


Figure 5-1

After switching ON the set, the red LED will blink as an indication that the monitor is in the ComPair mode.

5.7.2 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the DST service remote control allowing faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding how to repair the FTV1.9 in short time by guiding you step by step through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself; ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the FTV1.9 (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan FTV1.9 electronic manual, schematics and PCBs are only a mouse-click away.

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable. In case of the FTV1.9 chassis, the ComPair interface box and the FTV1.9 communicate via an I2C cable (bi-directional) The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in 2 ways:

1. Communication to the television (automatic)
2. Asking questions to you (manually)

ComPair combines this information with the repair information in its database to find out how to repair the FTV1.9.

Automatic information gathering
Reading out the error buffer, ComPair can automatically read out the contents of the entire error buffer.
Diagnosis on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the FTV1.9.

Manual information gathering
Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions and showing you examples. You can answer by clicking on a link (e.g. text or an waveform pictures) that will bring you to the next step in the faultfinding process.
A question could be: Do you see snow? (Click on the correct answer)
YES / NO
An example can be: Measure testpoint I7 and click on the correct oscillogram you see on the oscilloscope

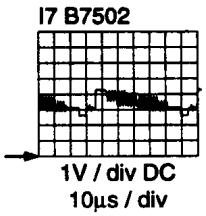


Figure 5-2

By a combination of automatic diagnostics and an interactive question/answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Additional features
Beside fault finding, ComPair provides some additional features like:

- Uploading/downloading of pre-sets
- Managing of pre-set lists
- Emulation of the Dealer Service Tool

5.7.3 Searchman (Electronic Service Manual)

If both ComPair and SearchMan are installed, all the schematics and PCB's of the faulty set are available when clicking on the hyper-link of a schematic or a PCB in ComPair.
Example : Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier.
Clicking on the PCB hyper-link, automatically shows the PCB with a highlighted capacitor C2568. clicking on the schematic hyper-link, automatically shows the position of a highlighted capacitor C2568 at the schematic.

5.7.4 Connecting the ComPair interface

The ComPair Browser software should be installed and setup before connecting ComPair to the FTV1.9. (See the ComPair Browser Quick Reference Card for installation instructions):

1. Connect the RS232 interface cable to a free serial (COMM) port on the PC and the ComPair interface PC connector (connector marked with "PC").
2. Place the ComPair interface box straight in front of the television with the infrared window (marked "IR") directed to the television LED. The distance between ComPair interface and television should be between 0.3 and 0.6

meter. (Note: make sure that (also) in the service position, the ComPair interface infra red window is pointed to the standby LED of the television set (no objects should block the infra red beam)
3. Connect the mains adapter to the connector marked "POWER 9V DC" on the ComPair interface
4. Switch the ComPair interface OFF
5. Switch the television set OFF with the mains switch
6. Remove the rear cover of the television set
7. Connect the interface cable (4822 727 21641) to the connector on the rear side of the ComPair interface that is marked "I2C" (See Figure)
8. Connect the other end of the interface cable to the ComPair connector on the monocarrier (see figure 5.xx)
9. Plug the mains adapter in the mains outlet and switch ON the interface. The green and red LED's light up together. The red LED extinguishes after approx. 1 second (the green LED remains lit).
10. Start-up Compair and select "File" menu, "Open...:; select "FTV1.9 Fault finding" and click "OK"
11. Click on the < xxxxx > icon to switch ON the communication mode (the red LED on the Compair interface wil light up)
12. Switch on the television set with the mains switch
13. When the set is in standby. Click on "Start-up in ComPair mode from standby" in the ComPair FTV1.9 fault finding tree, otherwise continue.

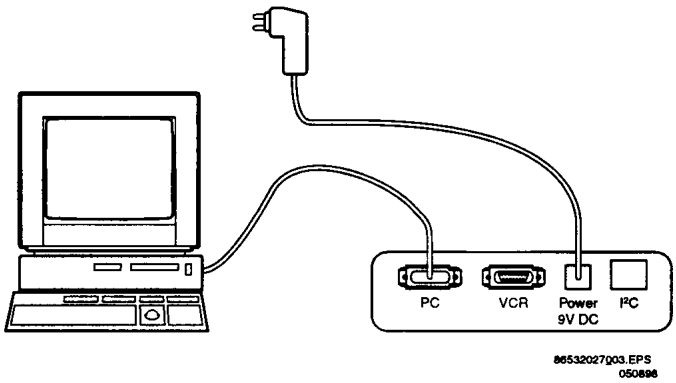


Figure 5-3

The set has now started up in ComPair mode. Follow the instruction in the FTV1.9 fault finding tree to diagnose the set. Note that the OSD works but that the actual user control is disabled

5.7.5 Preset installation

Presets can be installed in 2 ways with the FTV1.9.
- Via infra red
  - only sending TO the television
  - the rearcover does NOT have to be removed

Click on "File" "Open" and select "TV - use ComPair as DST" to use infra red
- Via cable
  - sending TO the television and reading FROM the television
  - the rearcover has to be removed

Click on "File" "Open" and select "FTV1.9 fault finding" to use the cable
Presets can be installed via menu "Tools", "Installation", "Presets".

5.7.6 Ordering ComPair

ComPair order codes:
- Starterkit ComPair + SearchMan software + ComPair interface (excluding transformer): 4822 727 21629
- ComPair interface (excluding transformer): 4822 727 21631
- ComPair transformer (continental) Europe: 4822 727 21632
- ComPair transformer United Kingdom: 4822 727 21633
- Starterkit ComPair software: 4822 727 21634
- Starterkit SearchMan software: 4822 727 21635
- Starterkit ComPair + SearchMan software: 4822 727 21636
- ComPair CD (update): 4822 727 21637
- SearchMan CD (update): 4822 727 21638
- ComPair interface cable (for FTV1.9): 4822 727 21641

1. Alignments

General: the Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5 'Service modes, faultfinding and repair tips'.

1.1 Alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage : 220 - 240 VAC (+/- 10 %)
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: Ri > 10MΩ Ci < 2,5 pF.

1.1.1 Selection of the SAM-menu

- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool, followed by password "3140" and < OK > button.
- Standard RC sequence 062596 (within OSD time-out) OSD
- By shorting test-point M28 and M29 on the AV Control panel on the monitor while switching on the set.

1.2 Adjustments on the D-box

1.2.1 Electrical Alignments

Pre-conditioner +5Vstby (PR3)
Connect a voltmeter to capacitor C2510 (PR2). With the aid of R3504 adjust the voltage to 5.2 V +/- 50 mV.

VsVa supply (FD)

Va-supply (Addressing of the PDP - FD1)
De-activated the PDP.
Connect a voltmeter to capacitor C2120 (FD1). With the aid of R3126 adjust the voltage to 55 V +/- 0.5 V.

Vs-supply (Sustain pulses - FD2)
De-activated the PDP.
Connect a voltmeter to capacitor C2020 (FD2). With the aid of R3026 adjust the voltage to 165 V +/- 0.5 V.

1.2.2 Software Alignments

White point

- Select the item "PDP test pattern" of the Service Alignment menu and set it to "ON.
- Select item " White point" of the Service Alignment menu.
- Enter the "white point" menu and adjust the value of one of the 4 submenu if necessary. Only the selected menu-item including its value remain on the screen when selected. The value has to changed within 5 seconds otherwise the main menu reappears again.

The 4 sub menu-items of the White point menu:

- "RED"
- "GREEN"
- "BLUE"
- "COLOUR TEMPERATURE"

- Leave the sub-menu by pressing "cursor up", "cursor down", "OK" or the "MenuOnOff" button and return to the main menu.
- Select the item "PDP test pattern" of the Service Alignment menu and set it to "OFF.

2. Circuit description and list of abbreviations

2.1 Circuit description

For a detailed description of the circuits see Training Manual FTV1.9 Display Box (3122 785 10036).

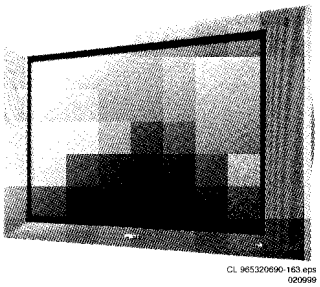
2.2 List of abbreviations

µP	Micro Processor
1FH	One time the line frequency for normal picture quality
2FH	Twice the line frequency for a better picture with less field flicker
2CS	2 Carrier Sound (sound system using two separate FM carriers at 5.5 MHz)
AARA	Automatic Aspect Ratio Adaptation
ADC	Analogue Digital Converter
ADJ	Adjust -
AFC	(S1) Automatic Frequency Control. Automatic fine-tuning circuit for signal reception.
AGC	Automatic Gain Control
AM	Amplitude Modulation
AMV	Automatic Multi Voltage
ANT	Antenna
AP	Asian Pacific region (Covering Hong Kong, Australia, Singapore etc.)
APC	Automatic Power Control
ASP	Aspect Ratio 4:3 or 14:9 or 16:9
AUD	Audio - GFL
AVB	Audio Video Buffer or Audio Video Blanking
BC	Beam current - GFL
BNC	Professional connector for higher frequencies
C	Centre
CINCH	Common connector for several kinds of signals
COMP	COMB-filter
CRT	Cathode Ray Tube
CVBS	Composite Video Blanking Synchronisation, video signal
DAC	Digital Analogue Converter
DEC	Decoder
DFB	Double Window Fast Blanking
DU	Double Window - U_signal
DV	Double Window - V_signal
DW	Double Window
DY	Double Window - Y_signal
E-Box	Electronic Box
EHT	Extra High Tension - GFL
ELPS	Eco Low Power Supply - GFL
EWD	East West Drive - GFL
EXT	External
FBL	Fast Blinking
FBX	Feature Box
FE	FrontEnd
FM	Frequency Modulation
FMS	Functional Module Specification
FRNT	Front
FRS	Functional Requirement Specification
FTV	Flat TeleVision
GFL	Global Feature Line (high end TV chassis)
GFL-FL	GFL Feature (up)Lift
GND	Ground
HFB	Horizontal FlyBack (display system sync. pulse)
HP	Headphone
HSI	Hardware Software Interface
HW	HardWare
I/O	Input / Output
I2C	IC bus, Inter Integrated circuit, on-board communication line
IF	Intermediate Frequency
IRQ	Interrupt ReQuest.
L	Left
L_CL VL	Left_Constant_Level Variable_Level
L_REC SEL	Left_Record_Select
LED	Light Emitting Diode
LP	Low Pass
LTP	Luminance Transient Processor
MAC	(Apple) MACintosh
MAC13	or MACII (Apple) MACintosh format for 13" monitors
MACP	Motion Adaptive Colour Plus
ML-2	Media Line 2
Monitor	PDP Display with all the electronic boards (incl. self developed boards).
MU	Main U_signal
MV	Main V_signal
MY	Main Y_signal
NICAM	Near Instantaneous Companding Audio Multiplex (digital terrestrial sound
NTSC	National TV Standard Committee
OE	(AQ) Output Enable
PAL	Phase Alternating Lines (Colour video standard)
PDP	Plasma Display Panel
PIP	Picture In Picture
PLL	Phase Locked Loop
POR	Power On Reset / Power Off Reset (depending on context)
QPSK	Quadruple Phase Shift Keying
R	Right
RAM	Random Access Memory
RC5	Remote Control 5 (infrared signal transmission protocol)
RECEI-RC5	Received RC5-code
REF	Reference
RES	Resistor
RGB	Red Green Blue, video signals
SC-1FH	Sandcastle 1FH
SCL	Serial Clock Line of the IC bus
SDA	Serial Data Line of the IC bus
SECAM	SEquential Couleur A Memoire (Colour video standard)
SIF	Second Intermediate frequency
SND	Sound
SOG	Sync On Green
SP_GAIN	Splitter GAIN
SPHsync	Splitter Horizontal Sync
SPVsync	Splitter Vertical Sync
SSP	Small Signal Panel (of the GFL chassis)
STBY	Standby
SW	SoftWare / SubWoofer (depending on context)
SYNC	Synchronisation
SYS	System
Terr	Terrestrial
TP	Testpoint
TRASN	(AQ)
TSD	Terrestrial Sound Decoder (combination of 2CS and NICAM decoder)
TUN	Tuner

TXT	TeleteXT
TXT-KILL	Teletext killer (Signal to disable Teletext)
U-VIDCONTR	U-VideoContrast
VCO	Voltage Controlled Oscillator
VD	Vertical Drive
VGA	Video Graphics Array. In this document, the term VGA is used for all VGA
WE	Write Enable
Xtal	Crystal (Oscillator)
Y/C	Luminance (Y) signal / Chrominance signal (C)
YUV	Combination of colour difference signals

FTV1.9DE
AA

Service
Service
Service



Service Manual

Contents			Page	
1.	Technical specifications		2	
2.	Safety instructions, warnings and notes.		3	
3.	Directions for use		4	
4.	Mechanical instructions		8	
5.	Service modes, faultfinding and repair tips		12	
6.	*Block- and wiring diagrams, Testpoints and oscillograms*			
	Block diagram		19/20	
	IIC bus interconnection diagram		20	
	Testpoint overviews		21	
	Oscillograms		24	
	Supply voltage diagram		25	
	Wiring diagram		26	
7.	*Electrical diagrams and PWB layouts*		*Diagram*	*PWB*
	VsVa Supply	(Diagram FD1)	27	29/30
	VsVa Supply	(Diagram FD2)	28	29/30
	Pre-conditioner	(Diagram PR1)	31	33
	Pre-conditioner	(Diagram PR2)	31	33
	Pre-conditioner	(Diagram PR3)	32	33
	LED panel	(Diagram LD)	34	34
	Audio amplifier	(Diagram A1)	35	37
	Audio amplifier	(Diagram A2)	36	37
	Switch panel	(Diagram SD)	38	38
	Monitor microprocessor		39	40
	AV control	(Diagr. AVC1)	41	49/50
	AV control	(Diagr. AVC2)	42	49/50
	AV control	(Diagr. AVC3)	43	49/50
	AV control	(Diagr. AVC4)	44	49/50
	AV control	(Diagr. AVC5)	45	49/50
	AV control	(Diagr. AVC6)	46	49/50
	AV control	(Diagr. AVC7)	47	49/50
	AV control	(Diagr. AVC8)	48	49/50
	PDP limesco	(Diagram PD1)	51	60/61
	PDP limesco	(Diagram PD2)	52	60/61

Contents			Page	
	PDP limesco	(Diagram PD3)	53	60/61
	PDP limesco	(Diagram PD4)	54	60/61
	PDP limesco	(Diagram PD5)	55	60/61
	PDP limesco	(Diagram PD6)	56	60/61
	PDP limesco	(Diagram PD7)	57	60/61
	PDP limesco	(Diagram PD8)	58	60/61
	PDP limesco	(Diagram PD9)	59	60/61
8.	Electrical alignments		63	
9.	Circuit description and list of abbreviations		64	
10.	Spare parts list		66	

©Copyright reserved 1999 Philips Consumer Electronics B.V. Eindhoven, The Netherlands. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.

Published by JR9970 Service PaCE Printed in The Netherlands Subject to modification GB 3122 785 10170

PHILIPS

1. Technical specifications

1.1 Technical data D-box

Mains voltage	:	85 - 264Vac
	:	50Hz - 60Hz
Power dissipation	:	400W
Stand-by dissipation	:	< 1W

1.2 Connection facilities

1.2.1 Specification of the terminal sockets

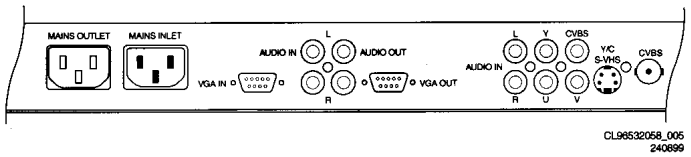


Figure 1-1

VGA-in

1	- R	(0.7Vpp 75Ω)
2	- G	(0.7Vpp 75Ω)
3	- B	(0.7Vpp 75Ω)
4	- Reserved	
5	- Bus-gnd	⏚
6	- R-gnd	⏚
7	- G-gnd	⏚
8	- B-gnd	⏚
9	- RC5	
10	- GND	⏚
11	- Config_Ident	
12	- Bus1 (TxD/ Rxd or SDA)	
13	- Hsync	
14	- Vsync	
15	- Bus2 (TxD/ RxD or SDA)	

VGA-out

1	- R	(0.7Vpp 75Ω)
2	- G	(0.7Vpp 75Ω)
3	- B	(0.7Vpp 75Ω)
4	- Reserved	
5	- gnd	
6	- R-gnd	
7	- G-gnd	
8	- B-gnd	
9	- Reserved	
10	- GND	
11	- Reserved	
12	- Reserved	
13	- Hsync	
14	- Vsync	
15	- Reserved	

Audio VGA-in

- Cinch Audio	L(0.5Vrms >= 10kΩ)	
- Cinch Audio	R(0.5Vrms >= 10kΩ)	

Audio VGA-out

- Cinch Audio	L(0.5Vrms >= 1kΩ)	
- Cinch Audio	R(0.5Vrms >= 1kΩ)	

SVHS

1	- GND	
2	- GND	
3	- Y	(1Vpp / 75Ω)
4	- C	(0.3Vpp / 75Ω)

Audio_in:

- Cinch Audio	L (0.5Vrms >= 10kΩ)	
- Cinch Audio	R (0.5Vrms >= 10kΩ)	

CVBS

- BNC - CVBS	(1Vpp / 75Ω)	

YUV

- Y	(1Vpp / 75Ω)	
3	- U	(1Vpp / 75Ω)
4	- V	(1Vpp / 75Ω)

1.3 Chassis overview

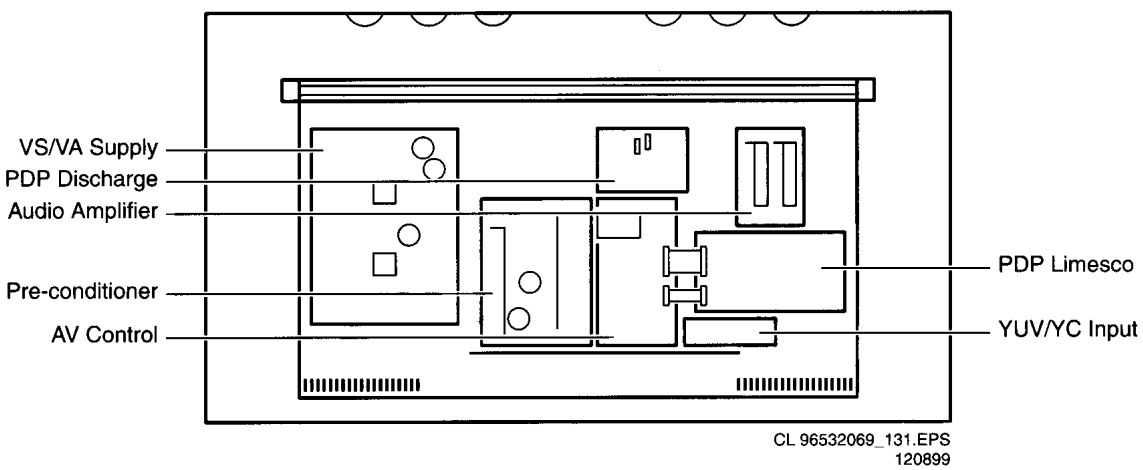


Figure 1-2

2. Safety instructions, warnings and notes

2.1 Safety instructions ⚠

It is not allowed to operate the FTV-set without glass plate. One function of this glass plate is to absorb Infrared Radiation. Without this glass plate the level of Infrared Radiation produced by the plasma display could damage your eyes.

1. Safety regulations require that during a repair:
   - the set should be connected to the mains via an isolating transformer (in this particular case a transformer of ≥ 800 VA);
   - safety components, indicated by the symbol ⚠ , should be replaced by components identical to the original ones;
2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.
   - Note: The wire trees should be routed correctly and fixed with the mounted cable clamps.
   - The insulation of the mains lead should be checked for external damage.
   - The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets that have a mains isolated power supply). This check can be done as follows:
     - unplug the mains cord and connect a wire between the two pins of the mains plug;
     - set the mains switch to the on position (keep the mains cord unplugged!);
     - measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ;
     - switch off the TV and remove the wire between the two pins of the mains plug.
   - The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

2.2 Warnings

1. ESD

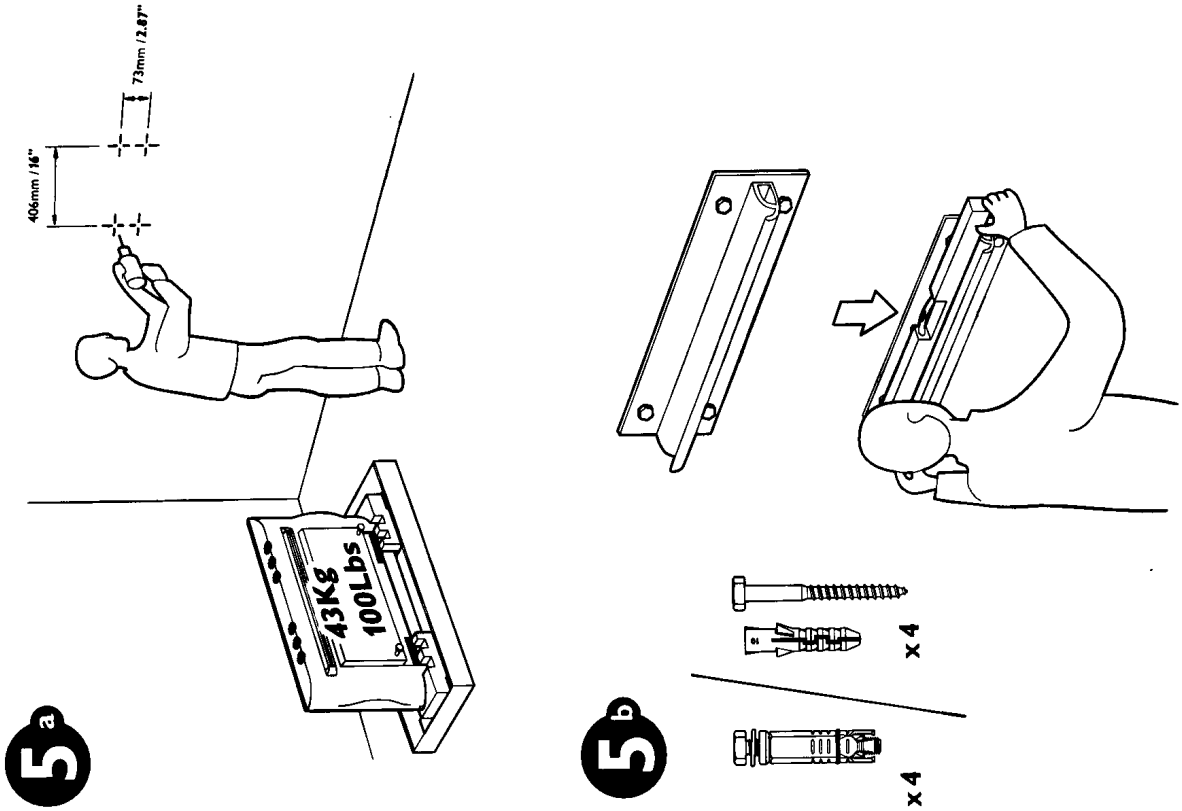
All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.

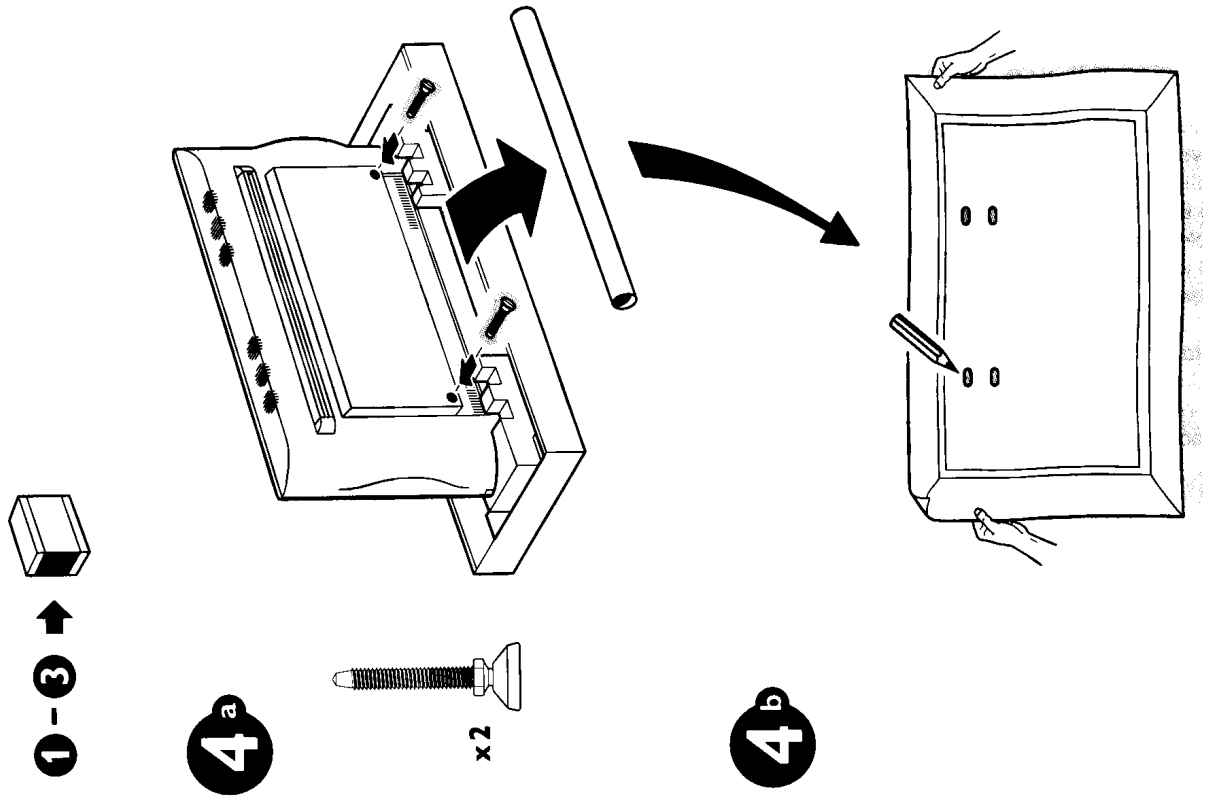
1. Available ESD protection equipment:
   - complete kit ESD3 (combining all 6 prior products - small table mat) 4822 310 10671
   - wristband tester 4822 344 13999
2. Never replace modules or other components while the unit is switched on.
3. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

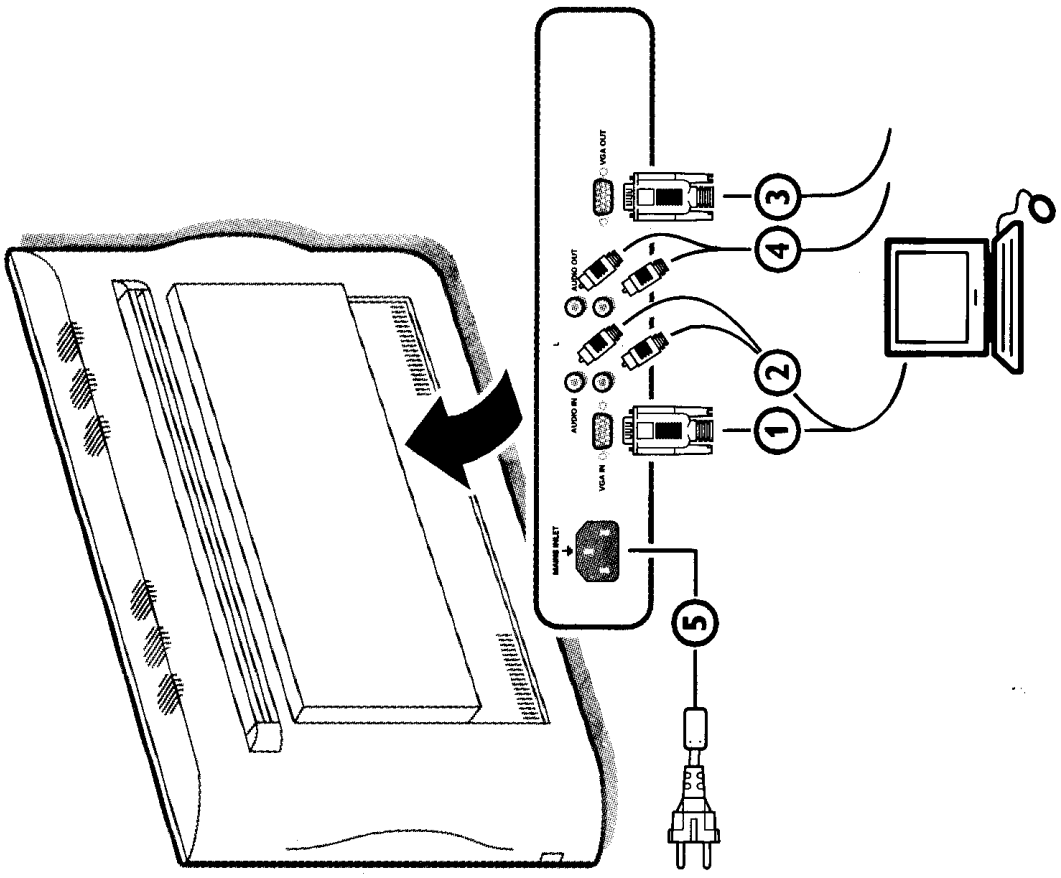
2.3 Notes

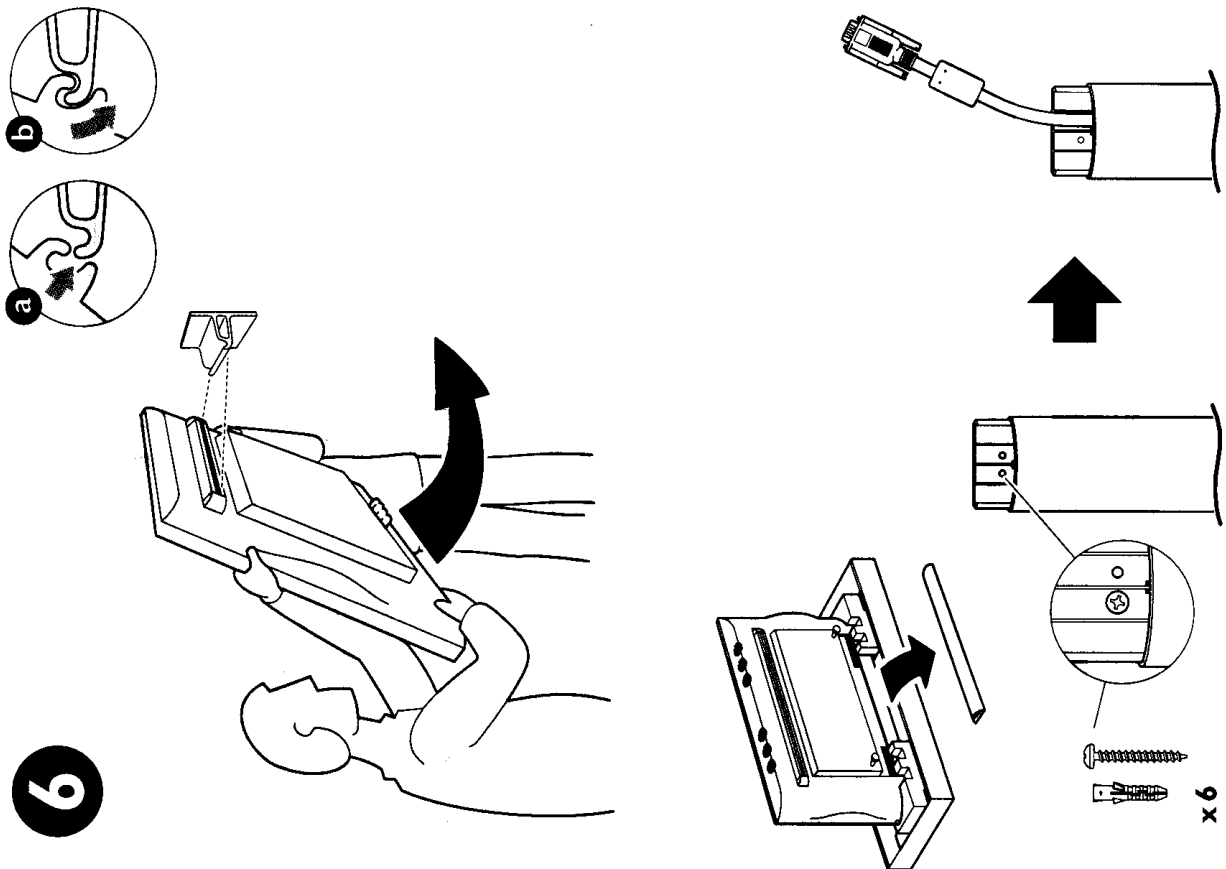
1. A glass plate is positioned before the plasma display. This glass plate can be cleaned with a slightly humid cloth. If due to circumstances there is some dirt between the glass plate and the plasma display panel it is recommended to do some maintenance by a qualified service employee only.
2. Never disconnect the power display cable when the set is operating
3. With DST no failures (error-codes) can be red, when the set is in Service-mode.
4. If DST reacts with 'error 2', there is no communication between set and DST. Note that IR-transmitter LED is positioned at right side of IR-receiver eye of the E-box. Take into account that receiver-LED on DST is positioned not in the middle but at the left side. Point corresponding LED's to each other. In case the amount of Infrared produced by the screen pollutes the communication, the set can be set in Standby-mode. Then still the error-messages can be retrieved.

3. Directions for use






VGA OUT
AUDIO OUT
AUDIO IN
VGA IN
MAINS INLET
1
2
3
4
5


a
b
6
x6

Unpacking and wall mounting instructions

For the unpacking instructions follow the illustrated steps printed on the packaging (outside and inside).
For the wall mounting instructions follow the illustrated steps ❹ to ❻ printed on the first pages of this instruction booklet.

Make sure that the wall mount is being fixed securely enough so that it meets safety standards. The weight of the monitor (excl. packaging) is about 43 kg.

Connect your computer

❶ Connect one end of the VGA cable ① supplied to the video card of the computer and the other end to the **VGA IN** connector at the rear side of the monitor. Fix the connectors firmly with the screws on the plug.

❷ In case of a Multimedia computer, connect the audio cable ② to the audio outputs of your Multimedia computer and to the **AUDIO IN R** (right) and **L** (left) inputs of the monitor.

Daisy chaining

The Active Loop Through facility makes it possible to make a daisy chain with a second VGA monitor.

❸ Connect one end of another VGA cable ③ to the **VGA OUT** connector at the rear side of the monitor and the other end to the **VGA IN** connector of a second VGA monitor.

❹ In case of a Multimedia computer, also connect the audio cables ④ to the **AUDIO L** and **R** outputs of the monitor and to the **AUDIO IN L** and **R** inputs of the second VGA monitor.

Note: only use the VGA cables supplied or use cables that are specially delivered with the monitor.

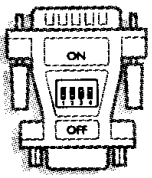
Connect your Apple Macintosh* computer

Attention: Macintosh computers with separate H and V synchronisation signals can be used together with the supplied adaptor. Macintosh computers with Composite Sync and Sync on Green signals may need a special (not supplied) adaptor or cable. Contact your dealer.

Connect the supplied switchable adaptor for Apple video connectors to one end of a VGA cable.

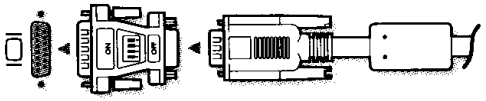
Put the DIP switches on the adaptor in the following positions :

1	2	3	4
off	off	on	on



Connect the end of the VGA cable with the adaptor to the video card of the computer and the other end to the **VGA IN** connector on the back of the monitor.

Screw the connectors down firmly.



15-pin D sub (2-row) — 15-pin mini D sub (3-row)

* Apple Macintosh is a registered trademark of Apple Computer, Inc.

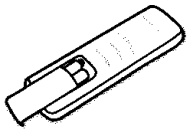
Computer Display modes

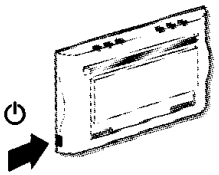
VGA	640x480	31.468 kHz	60 Hz
VGA	640x400	31.468 kHz	70 Hz
VGA	640x350	31.468 kHz	70 Hz
MAC II	640x480	35.000 kHz	67 Hz
SVGA	800x600	35.156 kHz	56 Hz
XGA	1024x768	45.000 kHz	56 Hz

When a VGA computer is connected, the selection is made automatically.

A message is displayed when the monitor does not support one of the above mentioned VGA modes.
Switch your computer to a correct display mode.

Operation



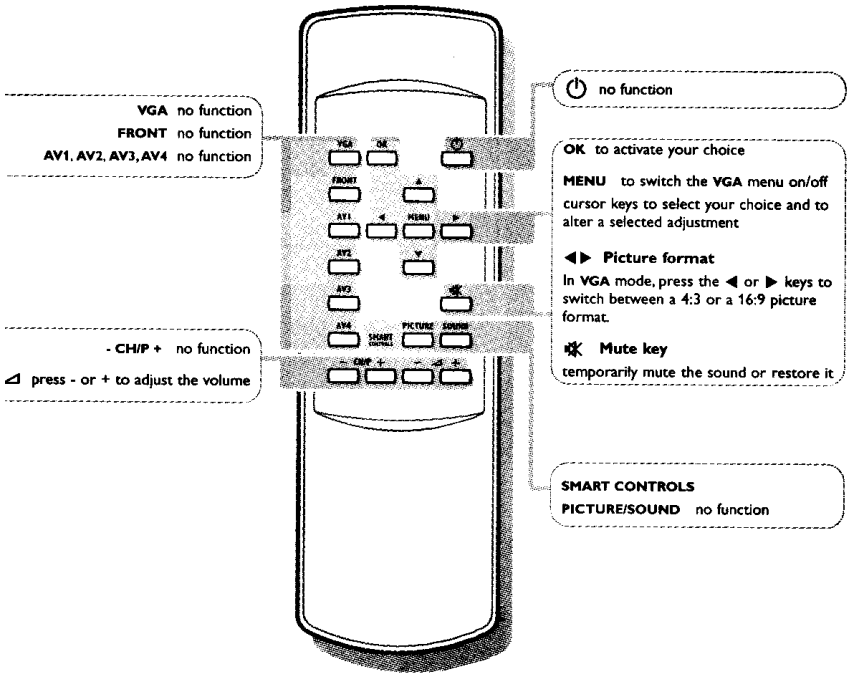


❶ **Insert the mains plug** ⑤ (see previous page for the illustration) supplied into the mains inlet at the back of the monitor and in the wall socket.
Please, only use the supplied rim-earthed mains cord with its built-in filter.

❷ **Remote control:** remove the cover of the battery compartment.
Insert the 2 batteries supplied (Type LR6AA-1.5V).
The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries batteries may not be disposed of with your household waste. Please check on how to dispose of batteries according to local regulations.

❸ **Switch the monitor on :** Press the power button ⏻ at the right side of the monitor.
A green indicator lights up and the screen comes on.
When the monitor does not receive a certain VGA signal the screen remains black.
Make sure that your PC is switched on and is in the correct display mode.

Use of the remote control


VGA no function
FRONT no function
AV1, AV2, AV3, AV4 no function
- CH/P + no function
press - or + to adjust the volume
no function
OK to activate your choice
MENU to switch the VGA menu on/off
cursor keys to select your choice and to alter a selected adjustment
◀▶ Picture format
In VGA mode, press the ◀ or ▶ keys to switch between a 4:3 or a 16:9 picture format.
Mute key
temporarily mute the sound or restore it
SMART CONTROLS
PICTURE/SOUND no function

VGA menu

1. Press the **MENU** key to switch on the **VGA** menu.
2. Select one of the symbols with the ▲ and ▼ keys:
   - for contrast
   - for brightness,
   - for colour temperature
   - for horizontal picture position
   - for vertical picture position
   - for volume
3. Press the ◀ and ▶ keys to alter the selected adjustment.
4. Press the **MENU** key again to switch off the **VGA** menu.

Tips

Ambient temperature
Do not hang up the monitor above a central heating or other heating sources.

Active Loop Through
The Active Loop Through facility makes it possible to make a daisy chain for VGA. Maximum 2 sets.

Care of the screen
Clean the anti-reflex coated flat glass screen with a slightly damp soft cloth. Do not use abrasives solvents as it can damage the glass surface of the screen.

Plasma Display characteristics
When switching over to another picture after having displayed the same still picture for a long time (many hours), it may happen that some parts from the previous picture will remain on screen due to a kind of memory effect. This ghost picture will disappear after some time. To avoid this effect change the pictures regularly or for PC use you can turn on a screen saver in your computer.
Philips has built in an automatic shift of the picture every 5 minutes to avoid this effect and to prolong the life of the screen.
Very incidentally and after a longer period of unuse (approx. 1 year) the screen may display some strange colour deficiencies. This is quite normal for plasma displays and these effects will disappear after the set has been turned on for some time.
A plasma display consists of more than 1,2 Million colour pixels. It is within industry standards that very few pixels (< 0.001%) may be defective, even for a new set. There is however no reason to doubt about the quality of the set.
The plasma display technology operates with rare gases which are being influenced by air pressure. Up to an altitude of 2000 m above sea-level, the display is functioning fine. Operating the set at a higher altitude, the picture becomes unstable and the picture performance is deteriorating. Bringing the set below 2000 m it works fine again. Transportation has no influence.

Control of peripheral equipment
The infrared signals of the screen may influence the reception sensitivity of other peripherals. Solution: replace the batteries of the remote control or change position of other equipment. E.g. keep away a wireless headphone from within a radius of 1.5 m.

No stable or not synchronised VGA picture
Check if you have selected the correct VGA mode in your PC (640x480, 640x400, 640x350, MAC II, SVGA, XGA).

No picture or no sound
Are the supplied cables connected properly? (The power cable to the display, the VGA cables, the audio cables,...)
Is your PC switched on?
Do you see a black screen and the indicator in front of the monitor lights up green, this means that the display mode is not supported.
Switch your VGA source to a correct mode.

Remote control
If your monitor no longer responds to the remote control, the batteries may be exhausted.

If your problem is not solved:
Switch your monitor off and then on again.
Never attempt to repair a defective monitor yourself.
Check with your dealer or call a TV technician.

Transport
Keep the original packaging to transport the monitor if needed.

End of life directives
Philips is paying a lot of attention to produce environmentally-friendly in green focal areas. Your new monitor contains materials which can be recycled and reused.
At the end of its life specialised companies can dismantle the discarded monitor to concentrate the reusable materials and to minimise the amount of materials to be disposed of.
Please ensure you dispose of your old monitor according to local regulations.

How to dispose of batteries ?
The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries batteries may not be disposed of with your household waste. Please ensure you dispose of batteries according to local regulations.

Miscellaneous
- Ambient temperature: + 5~ + 45°C
- Maximum operating altitude: 2000 m
- Mains: AC 100-240V
- Power consumption: around 350W
- Standby consumption: 1 W
- Weight (excl. packaging)
  Display: 42.5 kg
- Dimensions (wxhxd):
  Display: 122.2 x 68.1 x 14.6 cm
- Wall mounting bracket included

4. Mechanical instructions

4.1 Introduction:

There are pre-defined service positions for the following panels:

1. VS/VA SUPPLY panel.
2. PDP DISCHARGE panel.
3. AUDIO AMPLIFIER panel.
4. PRE-CONDITIONER panel.
5. AV CONTROL panel.
6. PDP LIMESCO panel.
7. YUV/YC INPUT panel.
8. LED DISPLAY panel.
9. SWITCH DISPLAY panel.

Before these panels can be accessed, the rear cover has to be removed:

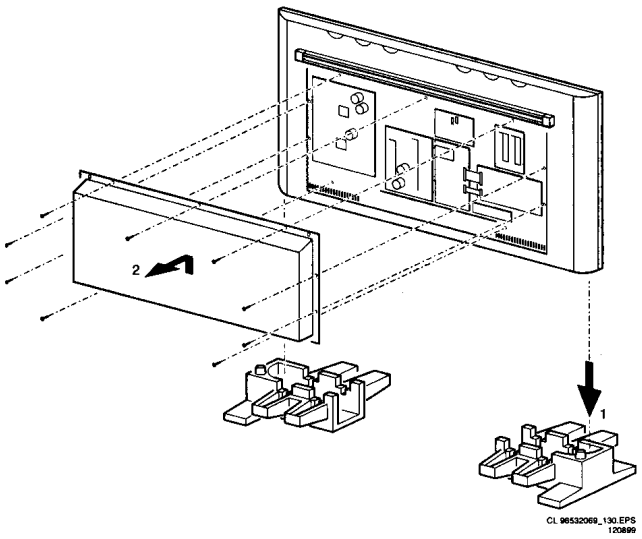


Figure 4-1

1. Place the Display Box in the service stand via 2 reinforced cushions (order code: 3122 126 30181).
2. Remove the 9 fixation screws of the rear cover.
3. Remove the rear cover (during removal push it slightly upwards).

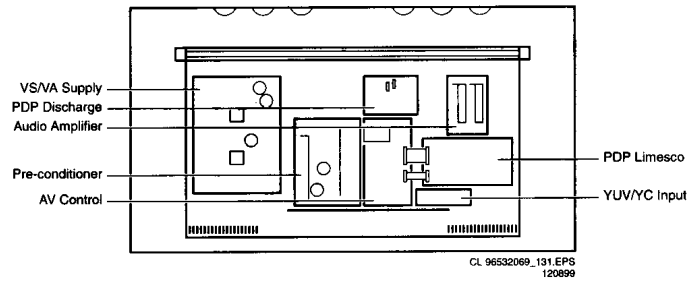


Figure 4-2

1. All panels are now accessible.

4.1.1 VS/VA SUPPLY panel.

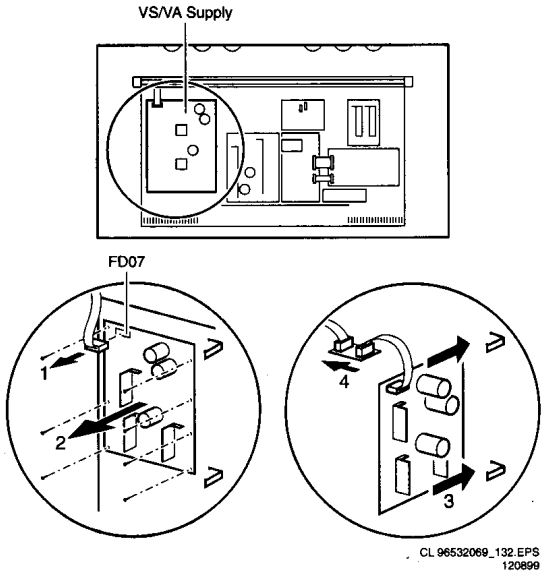


Figure 4-3

1. Disconnect Fan Supply cable from connector FD07 in the upper left corner [1].
2. Remove the 7 fixation screws of the panel [2].
3. Place panel on the 2 hinges, which are located near the right corners of the panel [3].
4. Use the mechanical service part (extension cable assembly, 12NC: 3122 785 90006) to extend the Fan Supply cable [4].
5. The copper side is now accessible from the left.

4.1.2 PDP DISCHARGE panel.

As in the FTV 1.5, this panel must be exchanged completely if defective.

4.1.3 AUDIO AMPLIFIER panel.

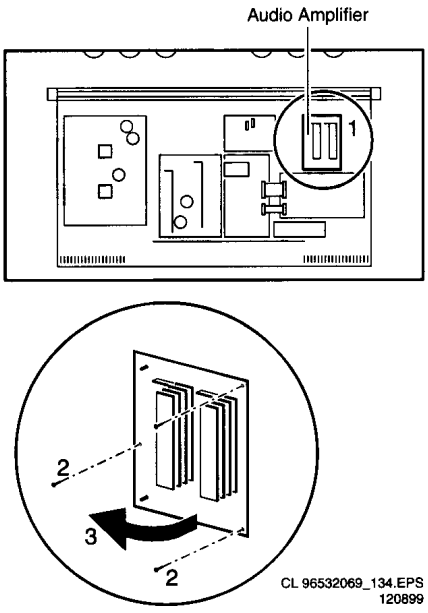


Figure 4-4

1. Some testpoints are accessible at the B-side [1].
2. If this is not sufficient, remove the 3 fixation screws of the panel [2].
3. Panel now can be hinged on the left side to access the A-side (soldering side) [3].

4.1.4 PRECONDITIONER panel.

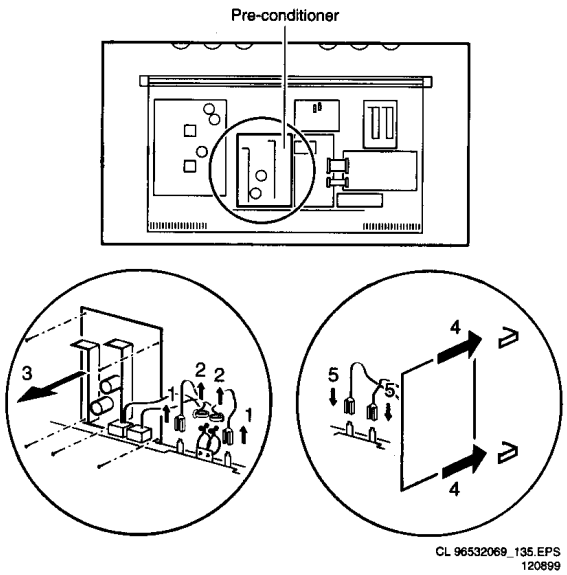


Figure 4-5

1. Disconnect the 2 grounding wires from the shielding plate by pressing the small lever on the connector while pulling [1].
2. Remove the 2 ferrite ring cores from their fixations [2].
3. Remove the 5 fixation screws of the panel [3].
4. Place panel on the 2 hinges, which are located, near the left corners of the panel [4].
5. Reconnect grounding wires to the extra connectors on the shielding plate at the left side [5].
6. The copperside becomes accessible now from the right side.

4.1.5 AUDIO VIDEO CONTROL panel.

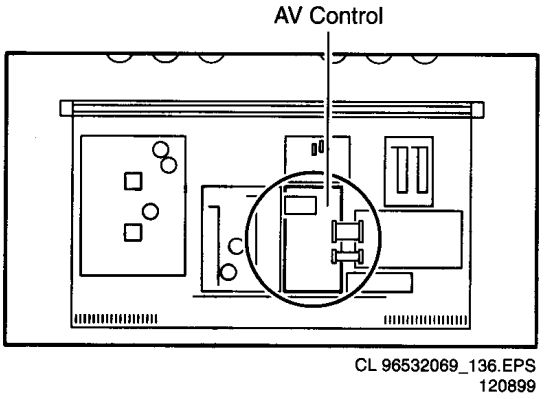


Figure 4-6

This panel has no service position for accessing the A-side, however all service test points are accessible at the B-side (see Service Manual).
In case some components must be (de)soldered, all fixation screws (6 for the panel, 5 at the metal connector plate) and all cables must be removed to access the A-side.

4.1.6 PDP LIMESCO panel.

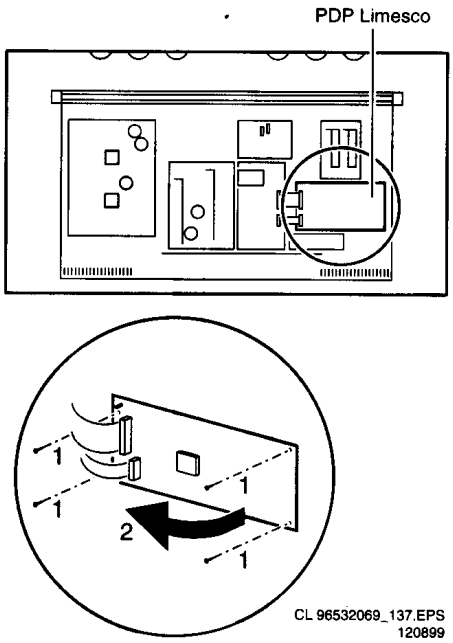


Figure 4-7

All SMC's are located on the B-side, so all testpoints are accessible. In case some components must be (de)soldered, the hinge construction can be used to access the A-side.
1. Remove the 4 fixation screws of the panel [1].
2. Panel can now be hinged to access soldering side [2].

4.1.7 YUV/YC INPUT panel.

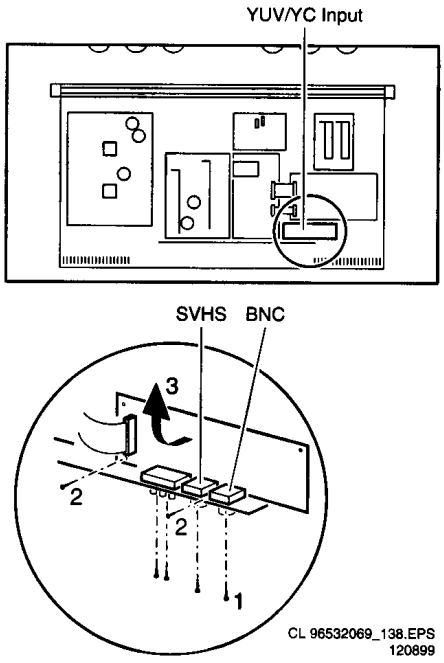


Figure 4-8

This panel has no pre-defined service position. For access of the A-side, the panel has to be removed:
1. Remove the 4 screws at the metal connector plate [1].
2. Remove the 2 fixation screws of the panel [2].
3. Panel can be removed now to access the A-side [3].

4.1.8 LED DISPLAY panel.

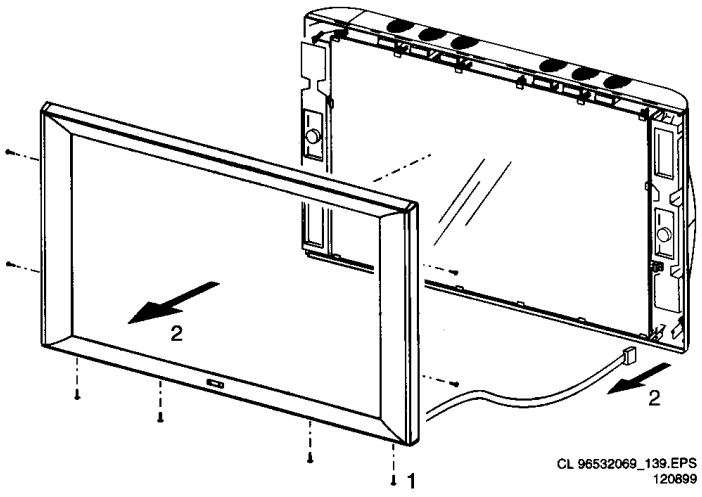


Figure 4-9

1. Remove 2 x 2 screws at the sides and 4 screws at the bottom of the front cover [1].
2. Remove the front cover (it hinges at the top). During removal unplug the cable of the LED DISPLAY panel at the SWITCH DISPLAY panel (connector SD11) [2].

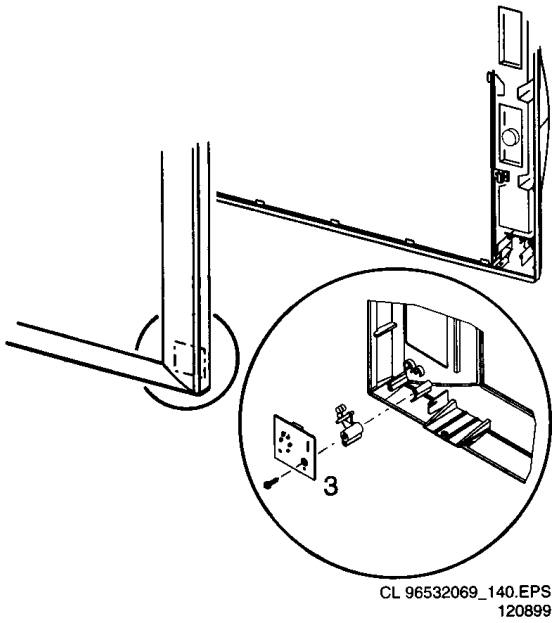


Figure 4-10

1. The LED DISPLAY panel can be removed now by unscrewing 1 fixation screw [3].

4.1.9 SWITCH DISPLAY panel.

1. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

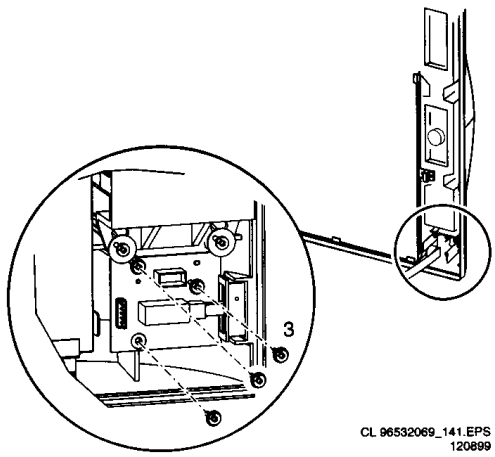


Figure 4-11

1. The SWITCH DISPLAY panel can be removed now by unscrewing 3 fixation screws [3].

4.2 Exchanging parts

Some parts of the FTV1.9 Display Box must be exchanged if defective:

1. GLASS PLATE.
2. LOUDSPEAKER.
3. PLASMA DISPLAY PANEL [PDP].

4.2.1 Exchanging of the GLASS PLATE.

1. First unplug (remove Mains and VGA cable) the Display Box .
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

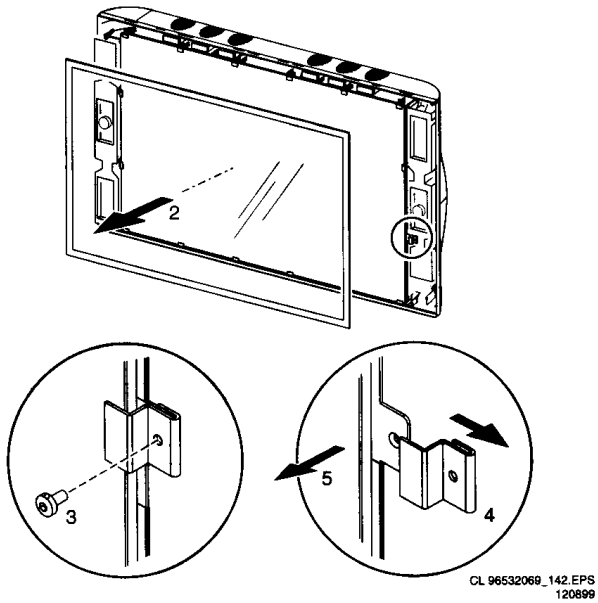


Figure 4-12

1. Now the GLASS PLATE can be removed by unscrewing all screws [3] and removing all glass clips [4].

4.2.2 Exchanging of a LOUDSPEAKER.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

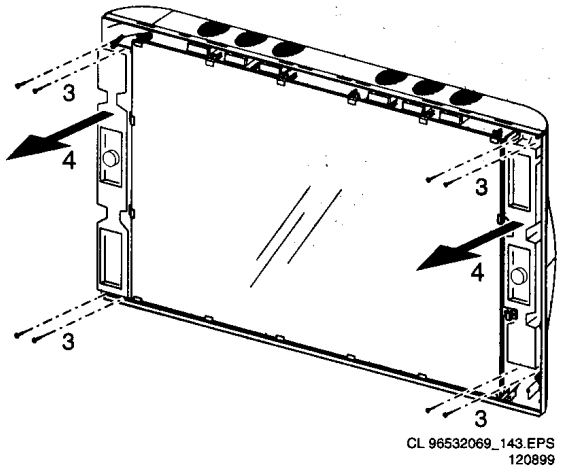


Figure 4-13

1. The LOUDSPEAKER can now be removed by disconnecting its cable and removing the 4 fixation screws at the top and bottom of the speakerbox. Be sure to remove the correct screws, otherwise the speaker system will be damaged (it is an airtight system).

4.2.3 Exchanging of the PDP.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Place the rear side of the Display Box on a foam cushion (be sure the metal rear cover is mounted in order to prevent damaging of the electronic panels).
3. Remove front cover (for a description see Chapter 1.1.8 LED DISPLAY panel).
4. Now the GLASS PLATE can be removed by unscrewing all screws and removing all glass clips (for a description see Chapter 1.2.1. 'Exchanging of the GLASS PLATE').

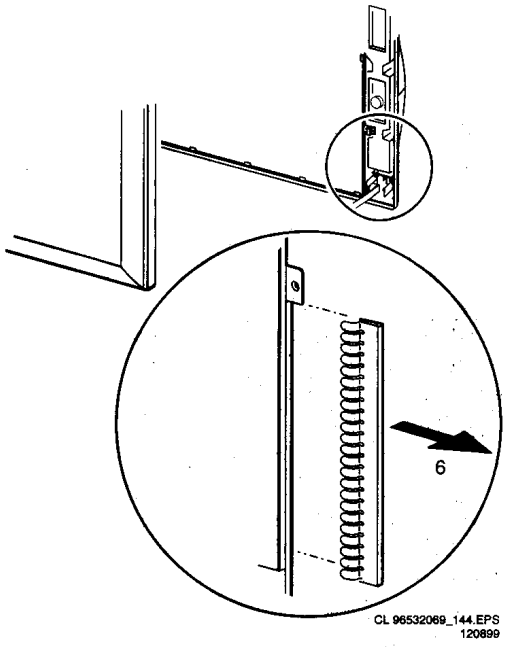


Figure 4-14

1. Remove all copper EMC SHIELDING springs mounted around the display [6].
2. Now flip the complete Display Box and place it with the Plasma Display down on a foam cushion. Be 100 % sure a large foam cushion is placed underneath the PDP, as it will drop about 10 mm after removing its fixation screws ! !
3. Disassemble metal rear cover (for a description see Chapter 1.1 'Introduction').

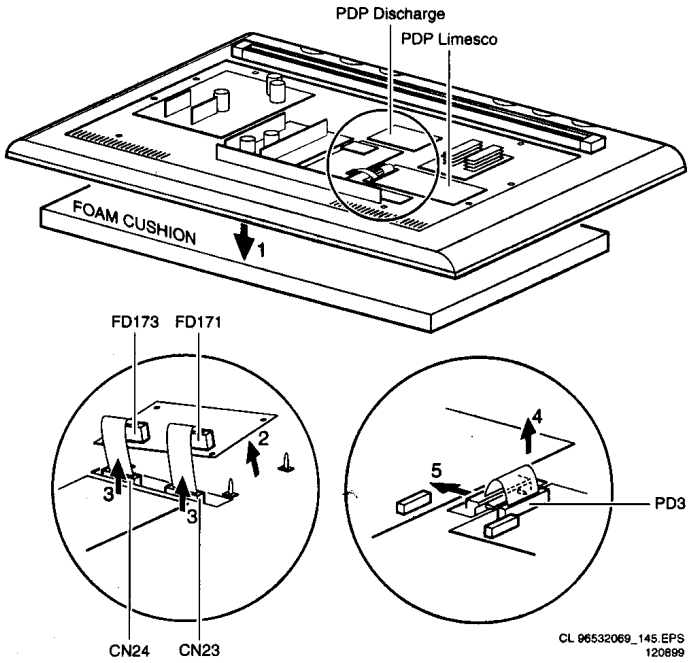


Figure 4-15

1. Disconnect the following cables:
   - Cables coming from connectors CN23 and CN24 of the PDP DISPLAY panel [3] (for easiest access lift the PDP DISCHARGE panel from its fixations [2]).
   - Flat cable on connector PD3 of the PDP LIMESCO panel [4]. Also remove the ferrite 'flat cable shield' completely by unlocking its fixations [5].

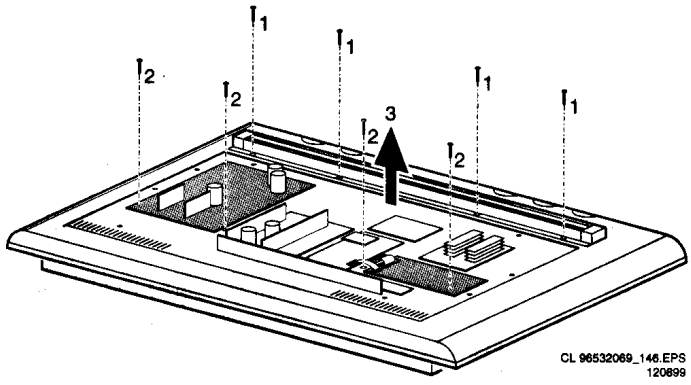


Figure 4-16

1. Now remove the 8 large screws which hold the PDP:
   - 4 screws are located at the top: they also hold the aluminium wall mount [1].
   - The other 4 are located at the bottom: the 2 outer screws are hidden behind panels. Therefor unscrew the VS/VA SUPPLY and the PDP-LIMESCO panel (grey panels) [2].
2. Lift encasing from PDP and replace PDP [3].

5. Service modes, fault finding and repair tips

For the FTV1.9, the Monitor can be used in two applications.
- A stand-alone configuration, a separate device which can also be sold and serviced separately.
- TV configuration, where the monitor is combined with the E-box.

The monitor, as a stand-alone unit, can be serviced by using a test pattern coming from the PDP-LIMESCO panel on the rear of the monitor itself or via a PC/laptop by using ComPair via the ComPair connector.
In this chapter the following paragraphs are included:
1. Test points
2. Dealer Service Tool (DST)
3. Service Modes
4. Error code buffer and error codes
5. The "blinking LED" procedure
6. Fault-finding tips
7. ComPair

5.1 Test points

The FTV1.9 chassis is equipped with test points in the service printing. These test points are referring to the functional blocks:
- A1-A2-A3, etc.: Test points for the Audio amplifier (A)
- C1-C2-C3, etc.: Test points for the AV control circuit (AVC)
- FD1-FD2-FD3, etc.: Test points for the VsVa supply (FD1-FD2) and the PDP discharge panel
- L1-L2-L3, etc.: Test points for the PDP LIMESCO (PD1-PD9)
- PR1-PR2-PR3, etc.: Test points for the Pre-conditioner (PR1-PR3)
- Y1-Y2-Y3, etc: Test points for the Y/C YUV monitor panel (UY1-YC4)

Measurements are performed under the following conditions:
Video: colour bar signal; Audio: 3 kHz left, 1 kHz right

5.2 Dealer Service Tool (DST)

For easy installation and diagnosis the dealer service tool (DST) RC7150 can be used. When there is no picture (to access the error code buffer via the OSD), DST can enable the functionality of displaying the contents of the entire error code buffer via the blinking LED procedure, see also paragraph 5.5. The ordering number of the DST (RC7150) is 4822 218 21232.

5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with pre-sets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I (DST interface; ordering code 4822 218 21277). For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the FTV1.9 chassis, download code 4 should be used).

5.2.2 Diagnose features for service

FTV1.9 sets can be put in two service modes via the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM).

5.3 Service Modes

Below described sequence is only valid for the "Monitor Only Configuration". When a Receiver box is connected to the Display Box (TV Configuration), please check chapter 5 in the Training Manual of the Receiver Box.

5.3.1 Service Default Mode (SDM)

The purpose of the SDM is:
- Provide a situation with predefined settings to get the same measurements as in this manual.
- Access to the error buffer via the blinking LED procedure.
- Inspection of the error buffer.
- Possibility to overrule software protections via the service pins (caution: override of software protections!).

Entering the SDM:
- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM).
- By pressing on a standard RC the following sequence 0, 6, 2, 5, 9, 6 followed by the "MENU" key.
- By short-circuiting the SDM pin on the µP panel.

In the SDM the following information is displayed on the screen:

```
-------------------------------------------------------------
F19DBC X.Y_12345 (1)   LLLL (2)   SDM (3)
ERR 02 01 14 ## ## ## ## ## ## ##
-------------------------------------------------------------
```

Explanation notes/references:
(1) Software identification of the main micro controller (F19DBC X.Y_12345)
- F19D is the chassis name for FTV1.9 display
- B is the region identification
- C is the language cluster
- X = (main version number)
- Y = (subversion number)
- ##### are 5 digits of the serial number

(2) "LLLL" Normal display operation in hours
(3) "SDM" To indicate that the TV set is in the service default mode
(4) "ERR 02 01 14 ## ## ## ## ## ## ## ##" This line shows the contents of the error buffer (max. 10 errors). The last error that occurred is displayed at the most left position. When less then 10 errors have occurred the rest of the line is empty. When the errorlist is empty " No errors" is displayed. No duplicate errors.
Exit the SDM:
Push the "STANDBY" button on the Remote Control.
The SDM sets the following pre-defined conditions:
- Volume level is set to 25% (of the maximum volume level).
- Linear Audio and Video settings are set to 50%.
- Colour temperature is set to normal.

The following functions are "overruled" in SDM since they interfere with diagnosing/repairing a set
- Video blanking.
- Slow demute.
- Anti-ageing.
- Automatic switch to "Standby" when H- and/or V-sync signals are lost.

All other controls operate normally.

5.3.2 Service Alignment Mode (SAM)

The purpose of the SAM is to align and or adjust settings.
For recognition of the SAM, "SAM" is displayed at the top of the right side of the screen
Entering the SAM-menu:
- By pressing the "ALIGN" button on the RC7150 Dealer Service
- Standard RC sequence 062596 followed by the "OSD" button.

- By short-circuiting the SAM pin on the µP panel (Caution: override of software protections ! !)

In the SAM the following information is displayed on the screen:

F19DBC X.Y_12345 SAM
ERROR## ## ## ## ##
WHITE POINT
PDP TEST PATTERN [ON/OFF]
STORE
RESET ERROR BUFFER

The menus and submenus

White point
The white point sub menu contains the following items:

- RED
- GREEN
- BLUE
- COLOUR TEMPERATURE

PDP Test pattern
By selecting this item, all OSD disappears from the screen. The screen now changes from light grey to dark grey in a slow regular rhythm. One can so easily check if all pixels of the monitor are correct.

Store
The change values are stored in the NVM.

Reset Error Buffer
This option will reset the error buffer.

Exit the SAM:
Push the "STANDBY" button on the Remote Control.
SAM menu control:
Menu items can be selected with the "UP" or "DOWN" key. Entry into the selected items (sub menus) is done by the "LEFT" or "RIGHT" key. The selected item will be highlighted. With the same "LEFT/RIGHT" keys, it is possible to increase/ decrease the value of the selected item.
Return to the former screen by pushing the "MENU" button.
The item values are stored in NVM if the sub menu is left.

5.3.3 Customer Service Mode (CSM) Display

FTV1.9 monitors are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and de-activated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible.
Entering the Customer Service Mode.

- By pressing on RC03333/01 the following sequence : Picture, sound, cursor up, cursor down, cursor left, cursor right followed by the "MUTE" button.

Exit the Customer Service Mode.

- pressing the "MENU" or any key on the Remote Control handset (except "P+" or "P-")
- switching off the TV set with the mains switch.

All settings that were changed at activation of CSM are set back to the initial values

The Customer Service Mode information screen
The following information is displayed on screen:

CUSTOMER SERVICE MENU

- Software version F19DBC X.Y_#####)
- Code 1: contains the last 5 error codes
- Code 2: contains the first 5 error codes with the last received error at the most left-hand side.
- Service unfriendly modes

5.4 Error code buffer and error-codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right.
In case of non-intermittent faults, clear the error buffer before starting the repair to prevent that "old" error codes are present. If possible check the entire content of the error buffers. In some situations an error code is only the RESULT of another error code (and not the actual cause).
Note: a fault in the protection detection circuitry can also lead to a protection
The error code buffer will be cleared in the following cases:

- exiting SDM or SAM with the "Standby" command on the remote control
- transmitting the commands "DIAGNOSE-9-9-OK" with the DST.

Leaving SDM or SAM with the mains switch does not reset the error buffer.
Examples:
ERROR: 0 0 0 0 0 : No errors detected
ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
ERROR: 5 6 0 0 0 : Error code 6 was first detected and error code 5 is the last detected (newest) error

Error -nr	Type of Error	Possible defect/cause
1	+5V	+5V pin at µP is low.
2	8V6	8V6 pin at µP is low.
3	Fan_prot	Gives an indication that 1 or more FAN(s) does not function, or that 1 or more fan control circuits is defect
4	Over-temp_prot	Temperature at the heatsink of the VsVa supply or the Preconditioner is too high
5	DC_prot	Audio-amplifier IC, its supply or the Audio amplifier is defect
6	Over_voltage_prot	Vs or Va supply voltage is too high
7	Vrr	Powersupply of the display is not correct. Ignorance of the signal during startup by the software.
8	Power_OKE	Power supply or modules that uses this voltage. If this signal is NOT activated means that all supply voltages are available (exception Audio supply)
9	Blocked NVM IIC bus	NVM IIC bus is not correct
10	Blocked slow IIC bus	Slow IIC bus is not correct
11	TDA9860	No acknowledge of Audio controller
12	TDA4885	No acknowledge of Video controller
13	MC141585	No acknowledge of OSD Generator
14	uPD93687 GD-LBD	No acknowledge of Limesco

Error -nr	Type of Error	Possible defect/cause
15	PCF8574 AT	No acknowledge of I/O Expander
16	NVM	No acknowledge of NVM
17	Communic ation	Fault in the communication

5.5 The "blinking LED" procedure

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. There are two methods:

- When the SDM is entered, the LED will blink the contents of the error-buffer. Error-codes = 10 are shown as followed. A long blink of 1second which is an indication of the decimal digit, followed by a pause, followed by n short blinks. When all the error-codes are displayed, the sequence is finished with a led display of about 3 seconds. The sequence starts again.
- With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 10 (the first error). The LED will operate in the same way as in the previous point, but now for the error code on position x.

Example:
Error code position 1 2 3 4 5
Error buffer: 12 9 5 0 0

- after entering SDM: 1 long blink of 1 sec. + 2 short blinks - pause - 9 short blinks - pause - 5 short blinks - pause - long blink of 3 sec. --etc.
- after transmitting "DIAGNOSE- 1- OK" with the DST: 1 long blink 2 short blinks - pause - 1 long blink + 2 short blinks - etc.
- after transmitting "DIAGNOSE- 2- OK" with the DST: blink (9x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 3- OK" with the DST: blink (5x) - pause - blink (5x) - etc.
- after transmitting "DIAGNOSE- 4- OK" with the DST: nothing happens

5.6 Protection structure

5.6.1 General

The protection structure of the FTV1.9 D-box is shown at figure 5.5.
The FTV1.9 monitor has one microprocessor, which is situated on the AV-control panel and is supplied by the 5V standby supply. The microprocessor is even active when the set is switched to standby. The microprocessor controls the "supply-on" line which switches first relay 5680 and then relay 5690. In de standby-mode or the protection-mode the "supply-on" line is "low" and both relays are switched off. The preconditioner is disconnected from the mains.
The protections of the FTV1.9 monitor can be divided into 5 subgroups:

- Fan_prot
- Over_temp_prot
- DC_prot
- Over_voltage_prot
- Vrr

For the Fan-, Over_temp, DC and the Over_voltage protections the signals for the µP are latching, using the 5Vstby_switched for powering the circuits permanently. The µP has sufficient time for diagnosis and for storing the error-codes in the NVM. Vrr, which is an indication of the powersupply of the display is correct, is directly fed to the µP.

5.6.2 Signal line "PROTECTION STATUS" and errorcodes

When one of the protection mechanism is triggered, the 5Vstby-switched is connected via a saturated transistor and a pre-defined resistor to signal line "protection status", which is connected to the µP.
Signal line "protection status" is connected to ground via resistor R3378 and 3379. For each separate fault condition mechanism we get a pre-defined voltage at the µП.
This results in the following table

Protection-mode	Series resistor	Voltage at "protection-status" line	Error-code
None	-----	< 0.3V	none
Fan_prot	1KΩ	0.30V < Vprot < 1.90V	3
Vs or Va_prot	470Ω	1.90V < Vprot < 2.80V	4
Temp_prot	220Ω	2.80V < Vprot < 3.75V	5
DC-prot	68Ω	3.75V < Vprot < 4.7V	6
Vrr	------	------	7

Protection signal Vrr coming from the PDP, to indicate that the powersupply is ok or not ok ("1" or "0") is directly connected to the µP. Error-code 7 is stored in the NVM and the set is switched to standby.
When one of the protections is activated, the power supplies of the Vs and Va are shut down and the set is switched to standby.

5.6.3 Fan protection

When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 3 is stored in the NVM.
The fan voltage is powered by 17V, but clamped to 12V to prevent damage. In order to be able to verify whether the fans are running, a fault detection circuit is implemented for each of the 6 fans. A running fan gives pulses in the same speed as the rotation of the blades. The circuit uses these pulses to trigger the discharge of an elcap. The elcap is continuously charged through a resistor.
Example : Capacitor C2319 is charged through R3356 and at every pulse discharged by T7322. When fan 6 is blocked, C2314 is charged via D6326 en triggers thyristor 7315, because C2319 is no longer discharged via T7322. The current now flows from the 5Vstby-switched via resistor 3383 and 3325 driving transistor T7321 into saturation. The voltage dividing of R3323 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7321.).

Reset of the VsVa-supply.
Transistor T7339 is shorted now by the presence of the "protection status" signal. T7339 connects resistor R3376 and R3389 to ground, switching on T7338. Thyristor 7333 is now triggered, shorting signal PROTS to ground. To follow the signal flow, go to the right upper corner of schematic FD1. Connecting PROTS to ground, will start a current flow through opto-coupler diode 7103 and the opto-coupler transistor connects supply voltage Vcc2 to the fault input (pin 10) of IC 7101. When the voltage at pin 10 exceeds 1.0V, IC7101 stops oscillating. The Va-supply stops functioning.
To continue the signal flow, go to the right upper corner of schematic FD2. Connecting PROTS to ground also results in a current flow through the opto-coupler diode of 7003. The opto-coupler transistor connects supply voltage Vcc1 to the fault input (pin 10) of IC 7001. When the voltage at pin 10 exceeds 1.0V, IC7001 stops oscillating. The Vs-supply stops functioning.

5.6.4 Vs and Va protection

Va protection
When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 4 is stored in the NVM.
When the Va-supply exceeds the 68V, regulator 7112 is triggered and will switch on T7113. Capacitor 2132 is charged via the 5Vstby-switched and will trigger thyristor 7114, which will switch on T7341. The voltage dividing of R3386 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7341). See schematic FD2.
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

Vs protection
When this protection is activated, the Vs power supply is shut down. The set is switched to the standby mode and error-code 4 is stored in the NVM.
When the Vs supply exceeds the 198V, regulator 7012 is triggered and will switch on T7016. Capacitor 2032 is charged via the 5Vstby-switched and will trigger thyristor 7013. Thyristor 7013 is fired and connects signal Aa to ground. To follow the signal flow, go to the right upper corner of schematic FD1.
When signal Aa is shorted to ground, T7341 is switched on. The voltage dividing of R3386 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7341). See schematic FD2.
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

5.6.5 Temperature Protection

When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 5 is stored in the NVM.
When the temperature of the heatsink on the Preconditioner panel or on one of the 2 heatsink on the VsVa panel exceeds the 110°C, the PTC resistance increases drastically. The voltage at pin 3 of IC7330 will drop and the output of 7330 will do the same. The current flow through opto-coupler diode 7331 results also in a current flow through the opto-coupler transistor and will trigger thyristor 7332. The fired thyristor switches transistor 7337 on. The voltage dividing of R3339 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7337).
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

5.6.6 DC Protection - Audio Amplifier

When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 6 is stored in the NVM.
In case of a fault in the Audio amplifier or when a DC voltage appears on the speaker output, a signal called DCPROT is generated. See schematic FD2 - F7. In case of a fault, thyristor 7314 is triggered and switches on T7340. The voltage dividing of R3380 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7340).
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

5.6.7 Vrr - PDP supplies

Vrr is a logical signal ("high" in normal circumstances) that comes from the PDP. It's purpose is to trigger the switch-off of the Pre-conditioner supply in case Vrr becomes "low" , to trigger the shutdown of the VsVa supply and to initialise that error-code 7 is stored in the NVM.
When signal Vrr becomes "low", see FD1 - section F13, the output of IC7301-B becomes "high". This results in two actions. It will trigger thyristor 7302 and short signal PROTS to ground. This results eventually in a reset of the VsVa supply.
Switching on T7371, which again switches on T7370 via the 5Vstby-switched supply. Signal-line "supply-on" is now grounded. This results in switching off relay 5680 and 5690, disconnecting the mains from the pre-conditioner. The standby supply (5Vstby-switched) is still functional. (See Fig. 5-5)

5.7 Fault finding tips

5.7.1 Pre-conditioner

The Pre-conditioner delivers the following output voltages:
- 5 VSTBY
- 5 VSTBY_switched
- 380 VDC
- Internal 12 VSTBY to supply the relay, which switches the mains input

To trouble shoot the pre-conditioner, first check the LED of the display-box.
- No red, green or orange LED indicates the absence of the +5Vstby_switched at the VsVa panel.

Check the +5Vstby_switched on pin 5 of connector PR08. If this voltage is present check the presence of this voltage at the VsVa-panel on pin 2 of connector FD04. See the wiring diagram of the monitor for more details.
If the voltage is not present, check R3508 and fuse 1500. In case of a defective R3508, check/replace item 7500, opto-coupler 7501, regulator 7502, and diode 6501 + 6502.
In case of an open circuit of fuse 1500, check/replace bridge 6500 and capacitor C2501.
If both component are alive, measure the voltage at pin 5 of IC7500 - Topswitch. If the waveforms resemble a burst-signal, the output is too heavy loaded. Check the output diode D6504 and capacitor C2508 of the 12VSB and diode 6505 and capacitor C2510 of the 5VSTBY.
- The red LED is blinking (+5Vstby is OK!), which is an indication of a protection.

Disconnect the VGA-cable between the E-box and the Monitor. Now the Monitor is operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.
Automatically the orange coloured LED of the monitor will blink the content of the error-buffer. If the sequence contains error-code 8, the cause could be a defective pre-conditioner. Error-code 8 is an indication that the +5V and/or the Vs/Va of the VsVa supply are not correct.
In case of error-code 4, switch OFF the set and check the temperature of the heatsink. In case of a high temperature of the heatsink, check MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.
In case of error-code 8, remove connector PR09 from the board. Short-circuit pin 2 of T7681 to ground, simulation of "SUPPLY_ON". (Caution - Protections overruled!!!)
Measure voltage at C2616. Is voltage 380Vdc?
Yes, the cause was a too heavy load/short-circuit at the VsVa-panel.
No, measure the voltage at C2606/C2607. Is this voltage a DC-voltage of approx. 300V with a strong ripple at a mains-input of 230Vac? If NO, check if relay 5690 is activated via the transistors T7684 + T7690. Check also PTC's 3600, 3601 and 3602 at their resistor-value.

Voltage is present at C2606. Check/replace NFR 3663 and 3668, if one of them is an open-circuit. In case R3663 is an open circuit, check/replace diode 6660, 6661 and capacitor C2664 plus IC 7660. If IC7660 is defect, check/replace IC 7650 and C2262. In case of an open circuit of NFR 3668, replace IC 7650.
NFR 3663 and NFR 3668 are not defect. Measure waveform at base of T7608. Is a square waveform present at gate of T7610? Check/replace MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.

5.7.2 VsVa-supply

The red LED is blinking (+5Vstby is OK!), which is an indication of a protection.
Disconnect the VGA-cable between the E-box and the Monitor. The Monitor is now operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.

- Error-code 1, check the +5V supply

Check fuse 1103. If the fuse is an open circuit, check/replace IC 7201. If fuse 1103 is OK, check the presence of the 17V. I this voltage is not present check fuse 1102 + 1104 and D6121 + D6122. If the 17V is present, then remove connector FD05. The reason could be a too heavy load or a short-circuit of the +5V supply. If after disconnection of connector FD05 the set still goes into protection, check D6203, NFR 3205 and the circuit around IC 7201.

- Error-code 2, check the 8V6 supply

Check regulator IC 7203, NFR 3099 and D6204.

- Error-code 8 there is something wrong with the POWER_OKE signal. When the POWER_OKE signal is low, the Vs and Va and the +5V are available.

Measure the voltage Va at C2120. Is the voltage between 55V and 65V? If not check fuse 1105 and D6120. If both components are OK, the cause could be a too heavy load.
Measure the voltage Vs at C2020. Is the voltage between 165V and 185V? If not check D6020. If D6020 is OK, the cause could be a too heavy load.
If both voltage are not present, check fuse 1004 at the input. If fuse 1004 is an open circuit, check the MOSFET's 7005 and 7006 for a short-circuit. In case of short-circuit use the repair-kit.
If fuse 1004 is OK, check the voltage at pin 15 of IC 7001. Is the voltage at pin 15 approx. 16-17V? If NO, check NFR 3002 and D6002 + D6030. If YES, check the waveforms FD49 and FD50 at pin 14 and 12. If they are present, check pulse transformer 5001 and the driver-circuits around MOSFET 7005 and 7006. If the waveforms FD49 and FD50 are not present, replace IC7001.

- Error-code 5, check the audio-supply or the Audio amplifier IC.

Check/replace fuse 1201 + 1202 and diode 6201 + 6202. If the components are OK, check the audio-amplifier IC.

- Error-code 6, check the Vs and/or the Va supply voltage.

The regulation-circuit of one of these voltages is not working correctly.
For the Va supply check opto-coupler 7102 and IC 7110.
For the Vs supply check opto-coupler 7002 and IC 7010

5.8 ComPair

5.8.1 ComPair mode

The monitor, as a stand-alone unit, can be diagnosed via a PC/ laptop by using ComPair via the ComPair connector. Before connecting the ComPair-cable at the AV Control panel on connector AVC34, the monitor must be put in the "ComPair - Mode ". This can be done by changing the jumpers at connector AVC39. Connector AVC39 is situated under the uP panel.
The figure below shows how to do it.

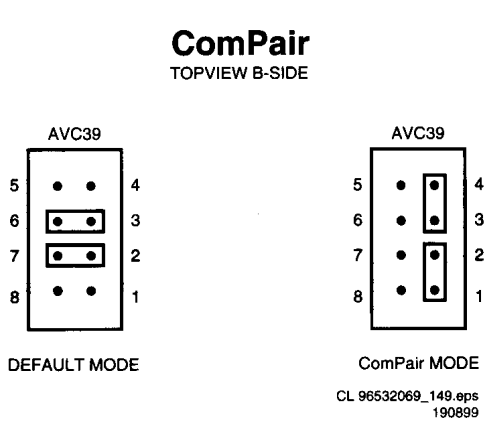


Figure 5-1

After switching ON the set, the red LED will blink as an indication that the monitor is in the ComPair mode.

5.8.2 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the DST service remote control allowing faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding how to repair the FTV1.9 in short time by guiding you step by step through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself; ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the FTV1.9 (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan FTV1.9 electronic manual, schematics and PCBs are only a mouse-click away.

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable. In case of the FTV1.9 chassis, the ComPair interface box and the FTV1.9 communicate via an I2C cable (bi-directional) The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in 2 ways:

1. Communication to the television (automatic)
2. Asking questions to you (manually)

ComPair combines this information with the repair information in its database to find out how to repair the FTV1.9.

Automatic information gathering
Reading out the error buffer, ComPair can automatically read out the contents of the entire error buffer.
Diagnosis on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the FTV1.9.

Manual information gathering
Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions and showing you examples. You can answer by clicking on a link (e.g. text or an

waveform pictures) that will bring you to the next step in the faultfinding process.
A question could be: Do you see snow? (Click on the correct answer)
YES / NO
An example can be: Measure testpoint I7 and click on the correct oscillogram you see on the oscilloscope

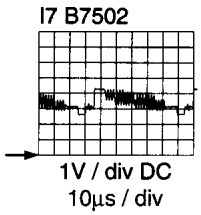


Figure 5-2

By a combination of automatic diagnostics and an interactive question/answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Additional features
Beside fault finding, ComPair provides some additional features like:
- Uploading/downloading of pre-sets
- Managing of pre-set lists
- Emulation of the Dealer Service Tool

5.8.3 Searchman (Electronic Service Manual)

If both ComPair and SearchMan are installed, all the schematics and PCB's of the faulty set are available when clicking on the hyper-link of a schematic or a PCB in ComPair.
Example : Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier.
Clicking on the PCB hyper-link, automatically shows the PCB with a highlighted capacitor C2568. clicking on the schematic hyper-link, automatically shows the position of a highlighted capacitor C2568 at the schematic.

5.8.4 Connecting the ComPair interface

The ComPair Browser software should be installed and setup before connecting ComPair to the FTV1.9. (See the ComPair Browser Quick Reference Card for installation instructions):
1. Connect the RS232 interface cable to a free serial (COMM) port on the PC and the ComPair interface PC connector (connector marked with "PC").
2. Place the ComPair interface box straight in front of the television with the infrared window (marked "IR") directed to the television LED. The distance between ComPair interface and television should be between 0.3 and 0.6 meter. (Note: make sure that (also) in the service position, the ComPair interface infra red window is pointed to the standby LED of the television set (no objects should block the infra red beam)
3. Connect the mains adapter to the connector marked "POWER 9V DC" on the ComPair interface
4. Switch the ComPair interface OFF
5. Switch the television set OFF with the mains switch
6. Remove the rear cover of the television set
7. Connect the interface cable (4822 727 21641) to the connector on the rear side of the ComPair interface that is marked "I2C" (See Figure 5-4)
8. Connect the other end of the interface cable to the ComPair connector AVC34 (0334) at the right/bottom side of the AV-Control panel.
9. Plug the mains adapter in the mains outlet and switch ON the interface. The green and red LED's light up together. The red LED extinguishes after approx. 1 second (the green LED remains lit).
10. Start-up Compair and select "File" menu, "Open...:; select "FTV1.9 Fault finding" and click "OK"
11. Click on the icon (Fig. 5-3) to switch ON the communication mode (the red LED on the Compair interface wil light up)
12. Switch on the television set with the mains switch
13. When the set is in standby. Click on "Start-up in ComPair mode from standby" in the ComPair FTV1.9 fault finding tree, otherwise continue.

Figure 5-3

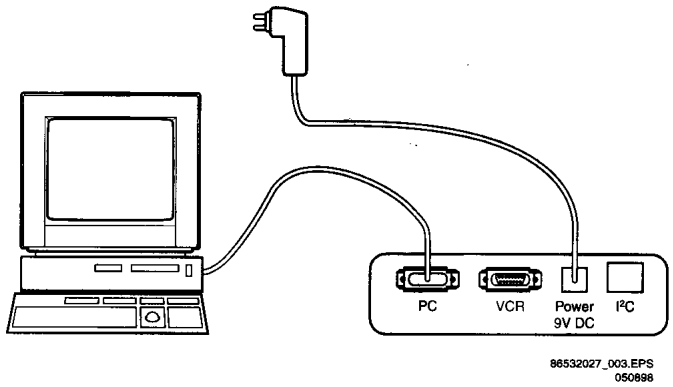


Figure 5-4

The set has now started up in ComPair mode. Follow the instruction in the FTV1.9 fault finding tree to diagnose the set. Note that the OSD works but that the actual user control is disabled

5.8.5 Preset installation

Presets can be installed in 2 ways with the FTV1.9.
- Via infra red
  - only sending TO the television
  - the rearcover does NOT have to be removed

Click on "File" "Open" and select "TV - use ComPair as DST" to use infra red
- Via cable
  - sending TO the television and reading FROM the television
  - the rearcover has to be removed

Click on "File" "Open" and select "FTV1.9 fault finding" to use the cable
Presets can be installed via menu "Tools", "Installation", "Presets".

5.8.6 Ordering ComPair

ComPair order codes:
- Starterkit ComPair + SearchMan software + ComPair interface (excluding transformer): 4822 727 21629
- ComPair interface (excluding transformer): 4822 727 21631
- ComPair transformer (continental) Europe: 4822 727 21632
- ComPair transformer United Kingdom: 4822 727 21633
- Starterkit ComPair software: 4822 727 21634

- Starterkit SearchMan software: 4822 727 21635
- Starterkit ComPair + SearchMan software: 4822 727 21636
- ComPair CD (update): 4822 727 21637
- SearchMan CD (update): 4822 727 21638
- ComPair interface cable (for FTV1.9): 4822 727 21641

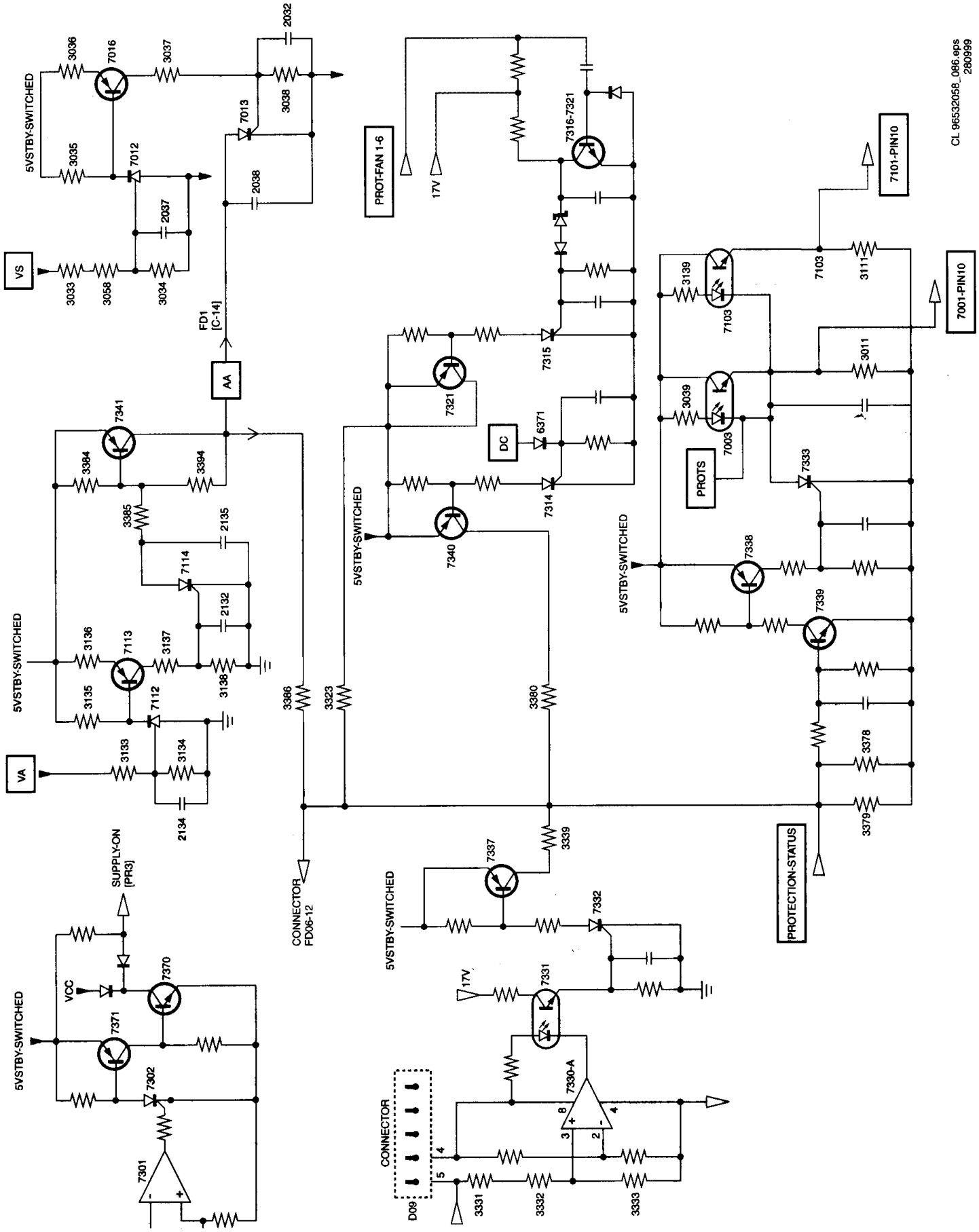
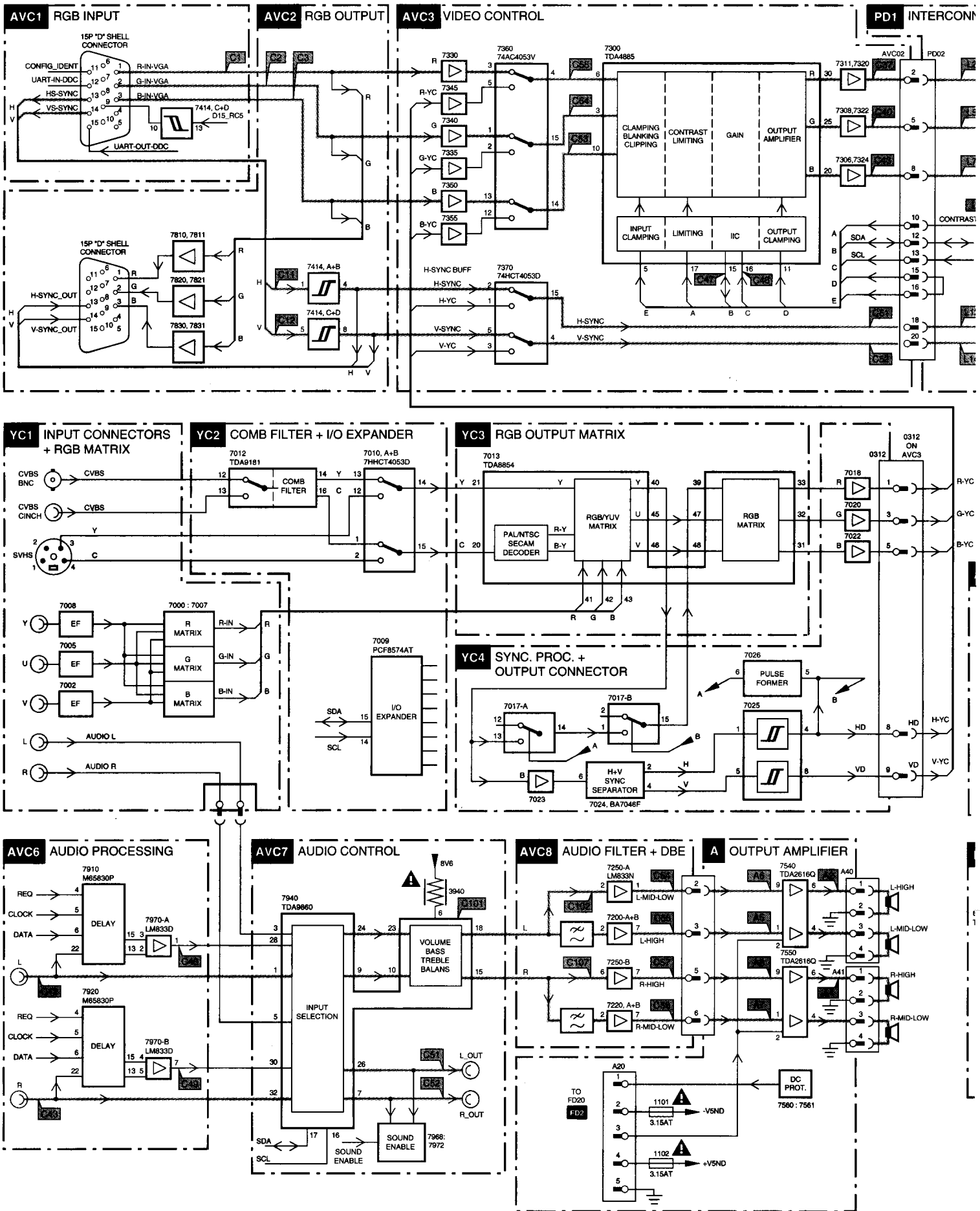
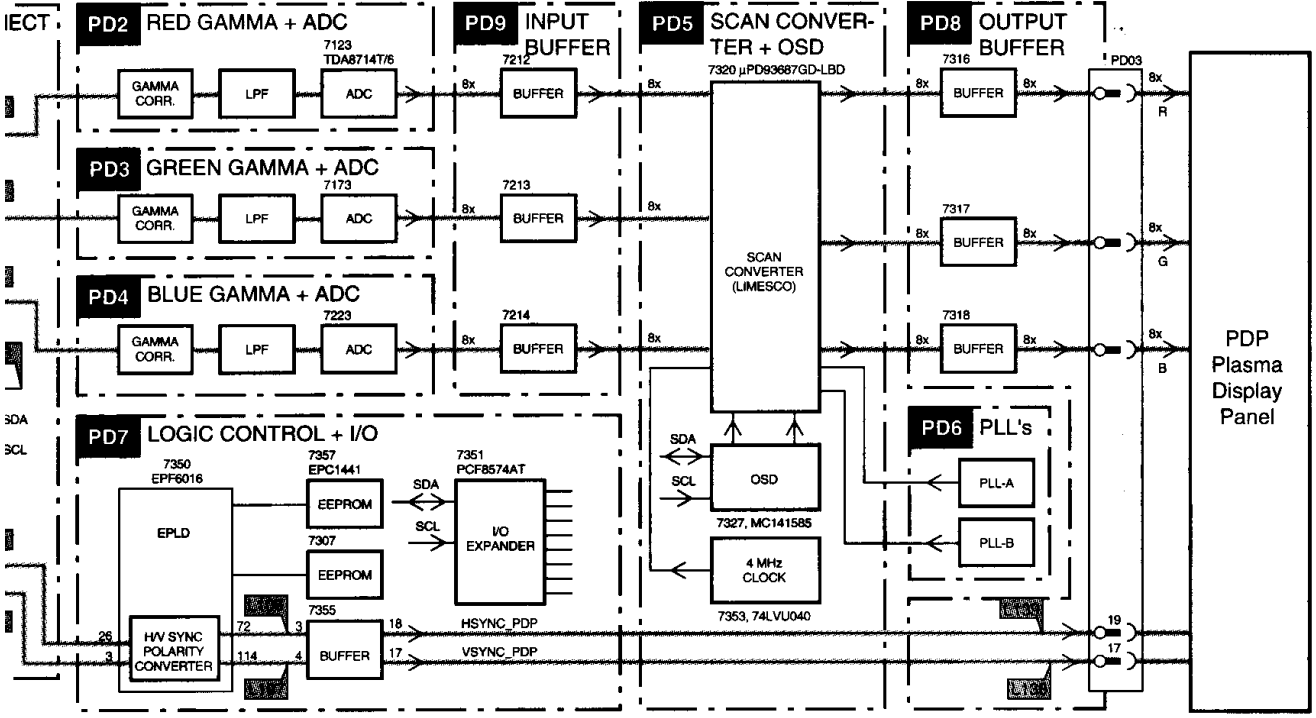


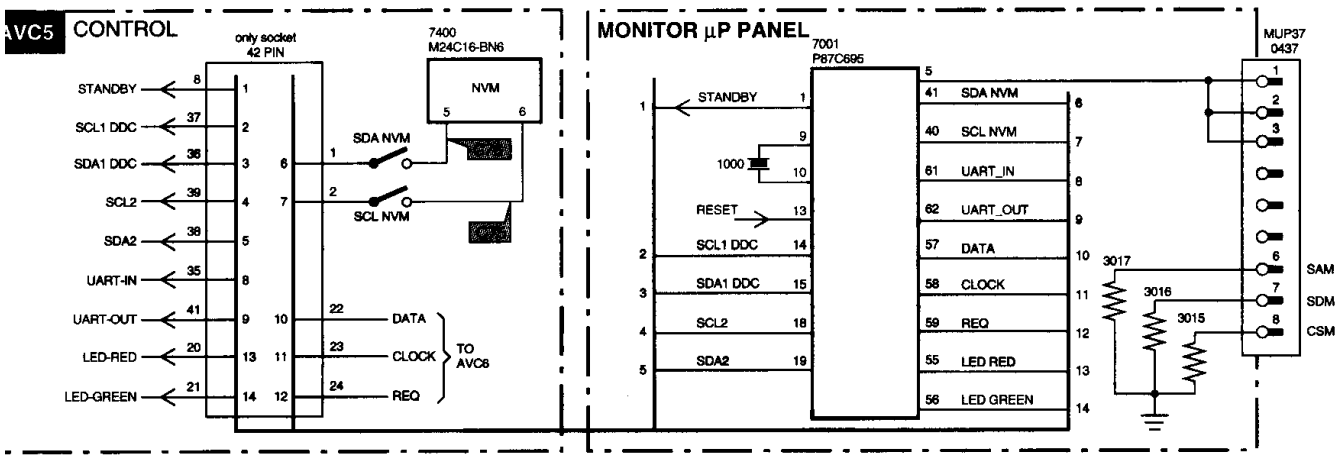
Figure 5-5

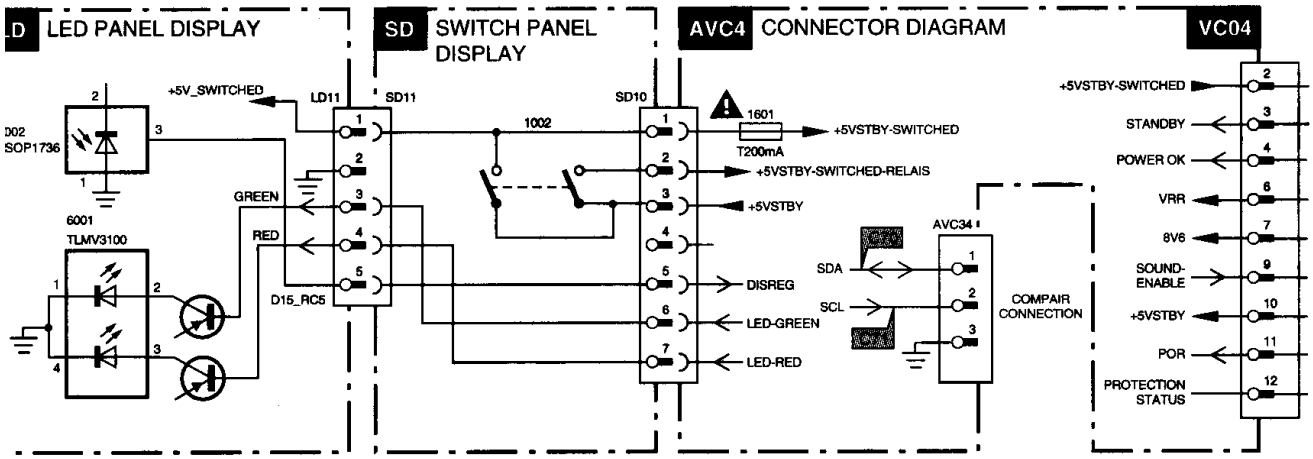
6. Block diagrams

Block diagram (Part 1)



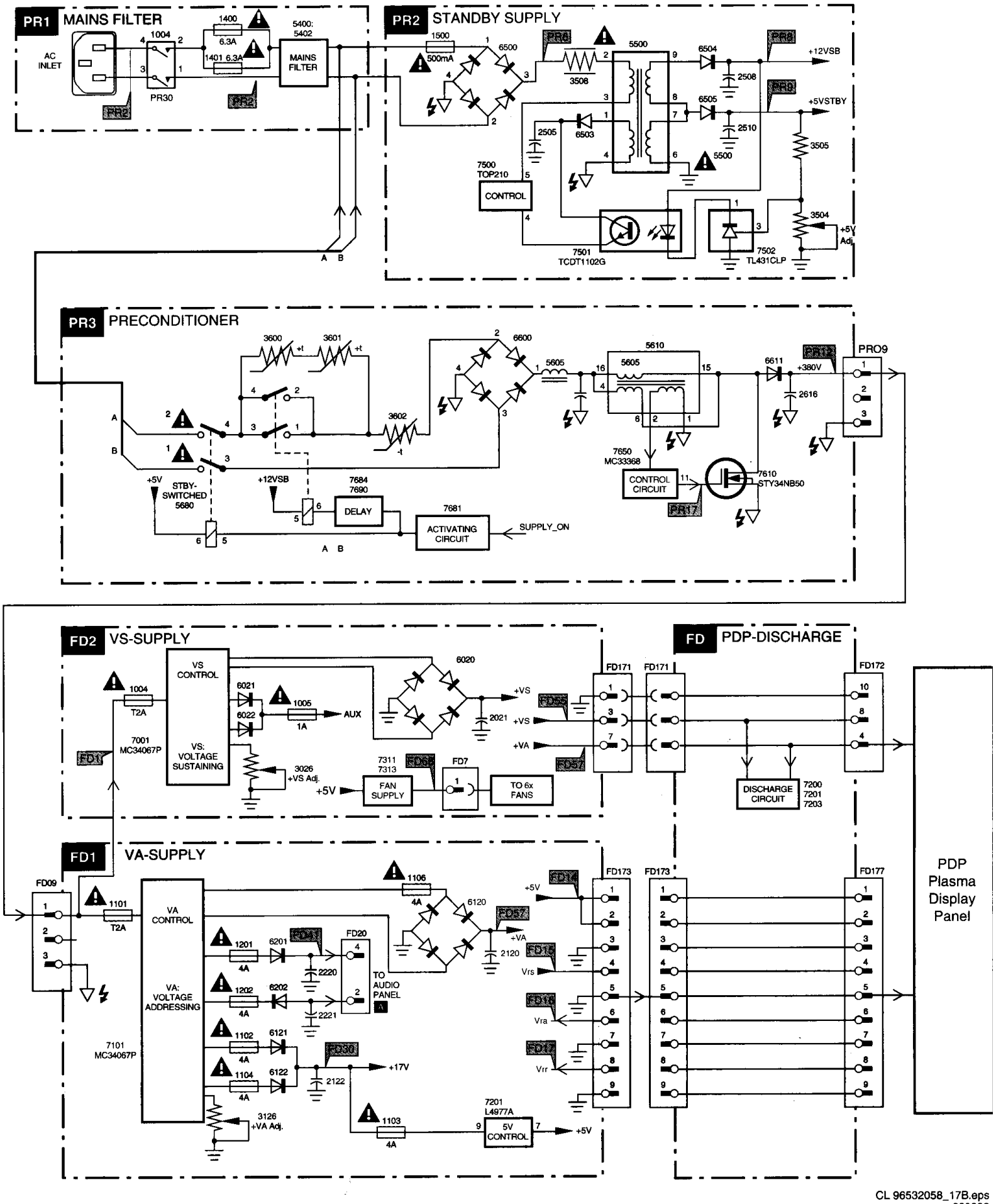






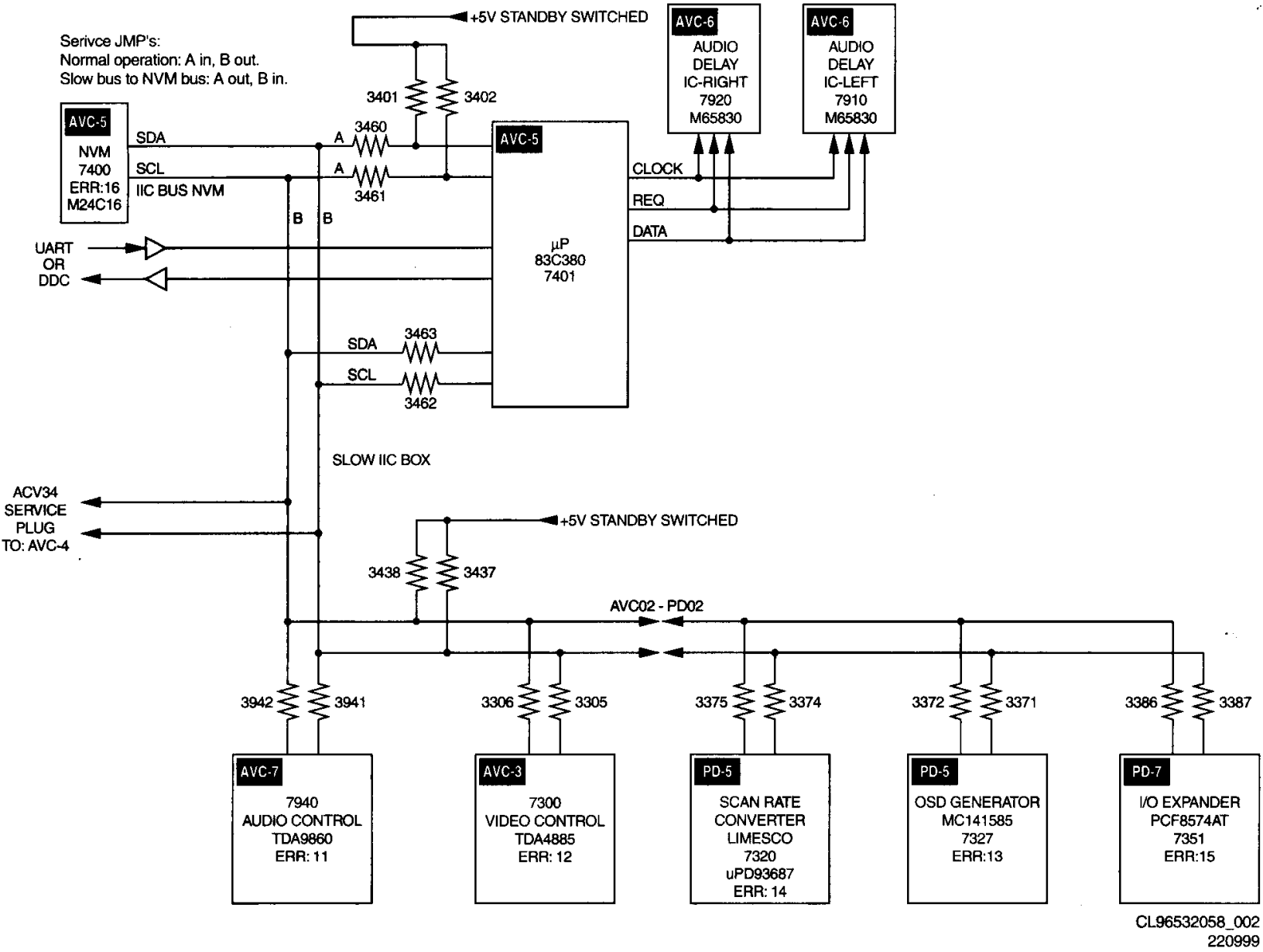
CL 96532058_17A.eps
260899

Block diagram (Part 2)



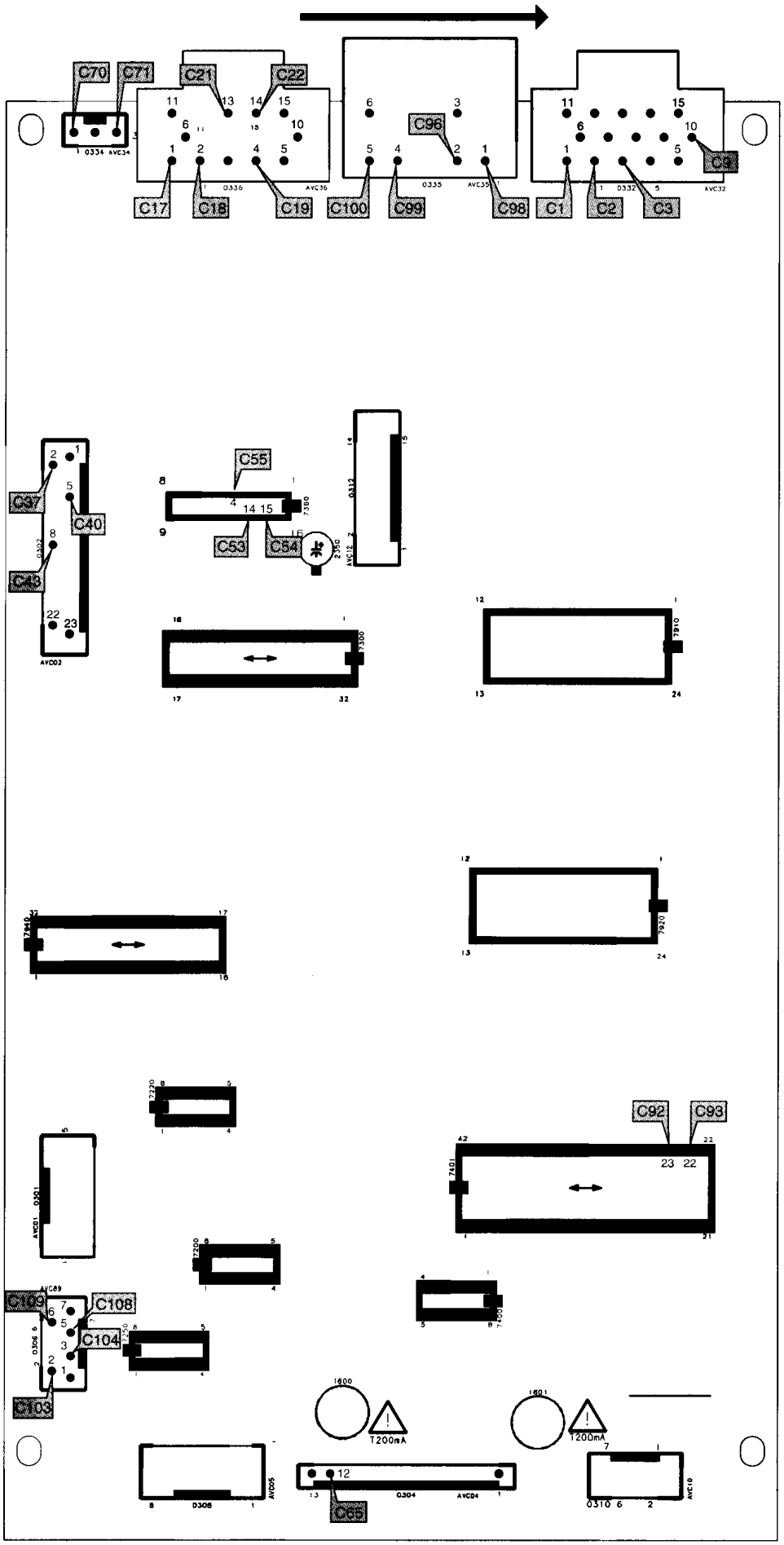
CL 96532058_17B.eps
280999

I2C bus interconnection diagram



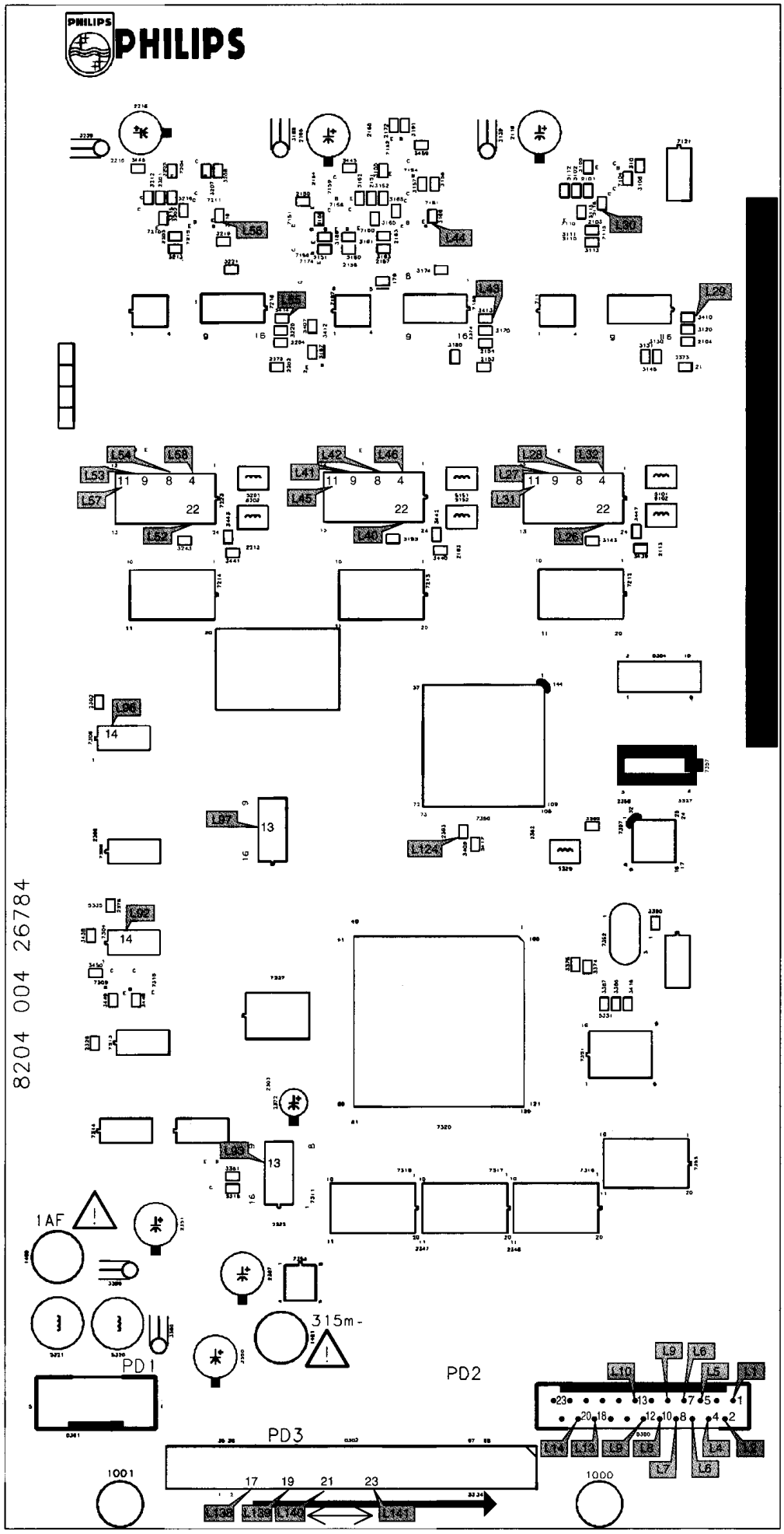
CL96532058_002
220999

Testpoint overview AV Control



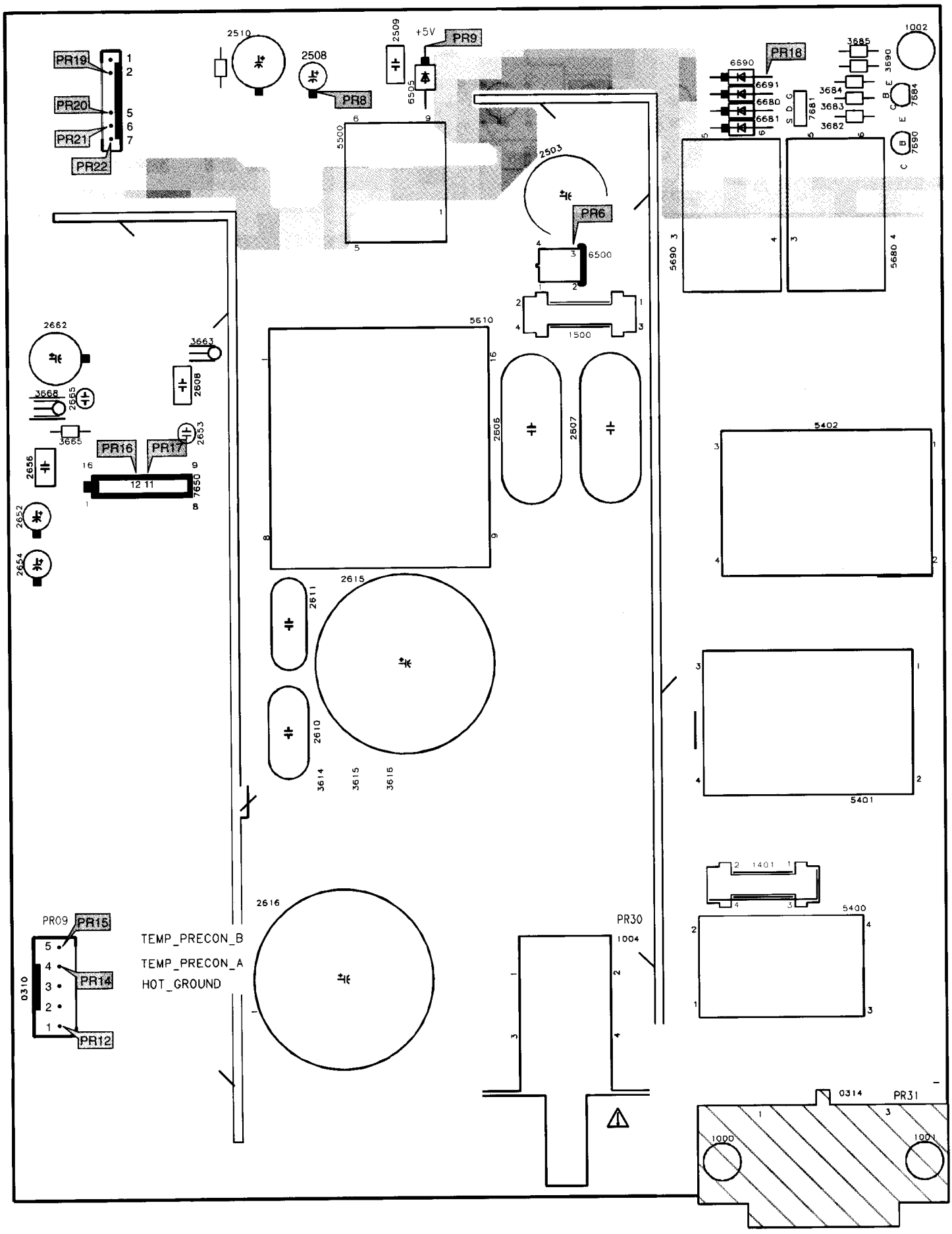
CL 96532058_019.EPS
240899

Testpoint overview Limesco



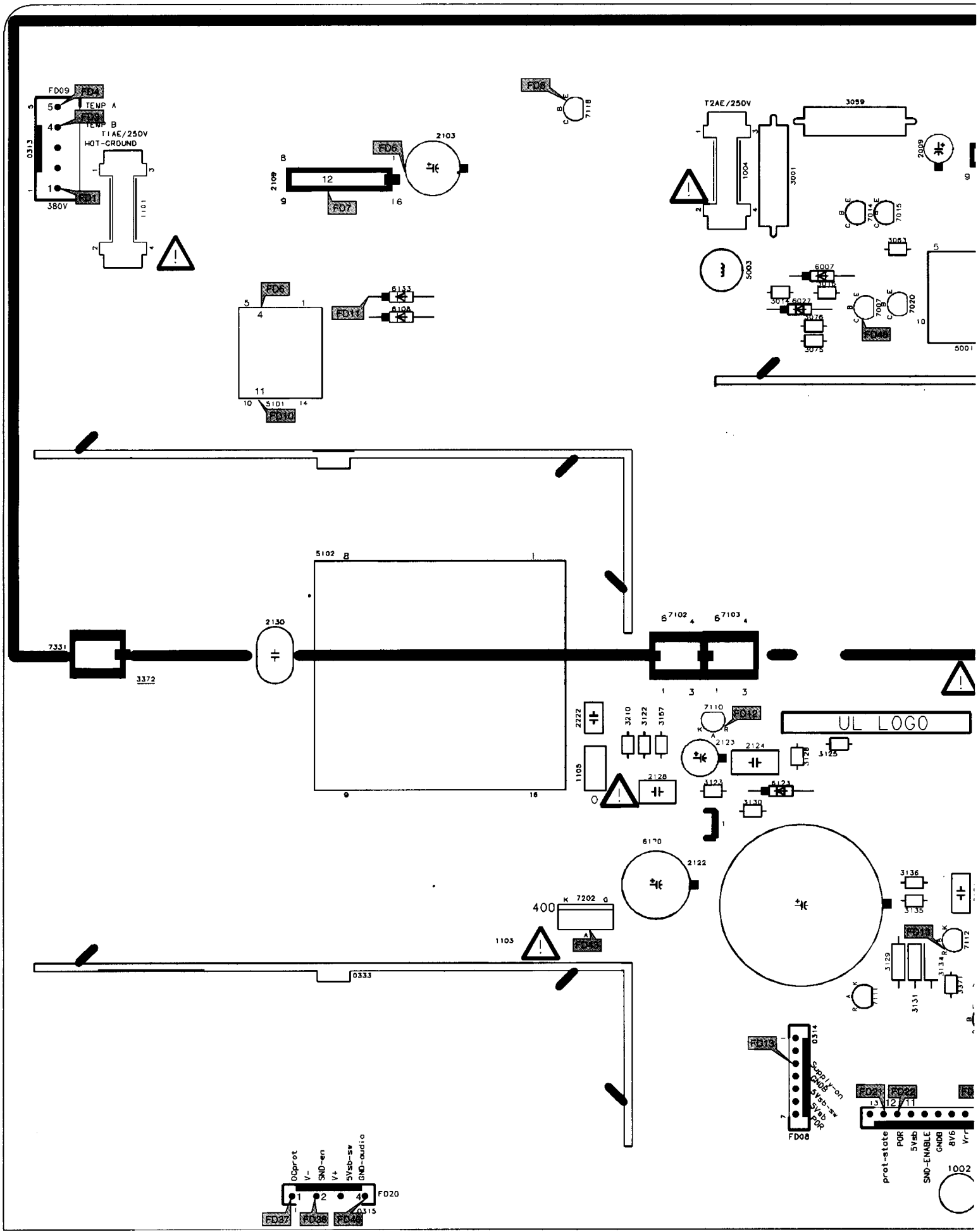
CL 96532058_020.EPS
270899

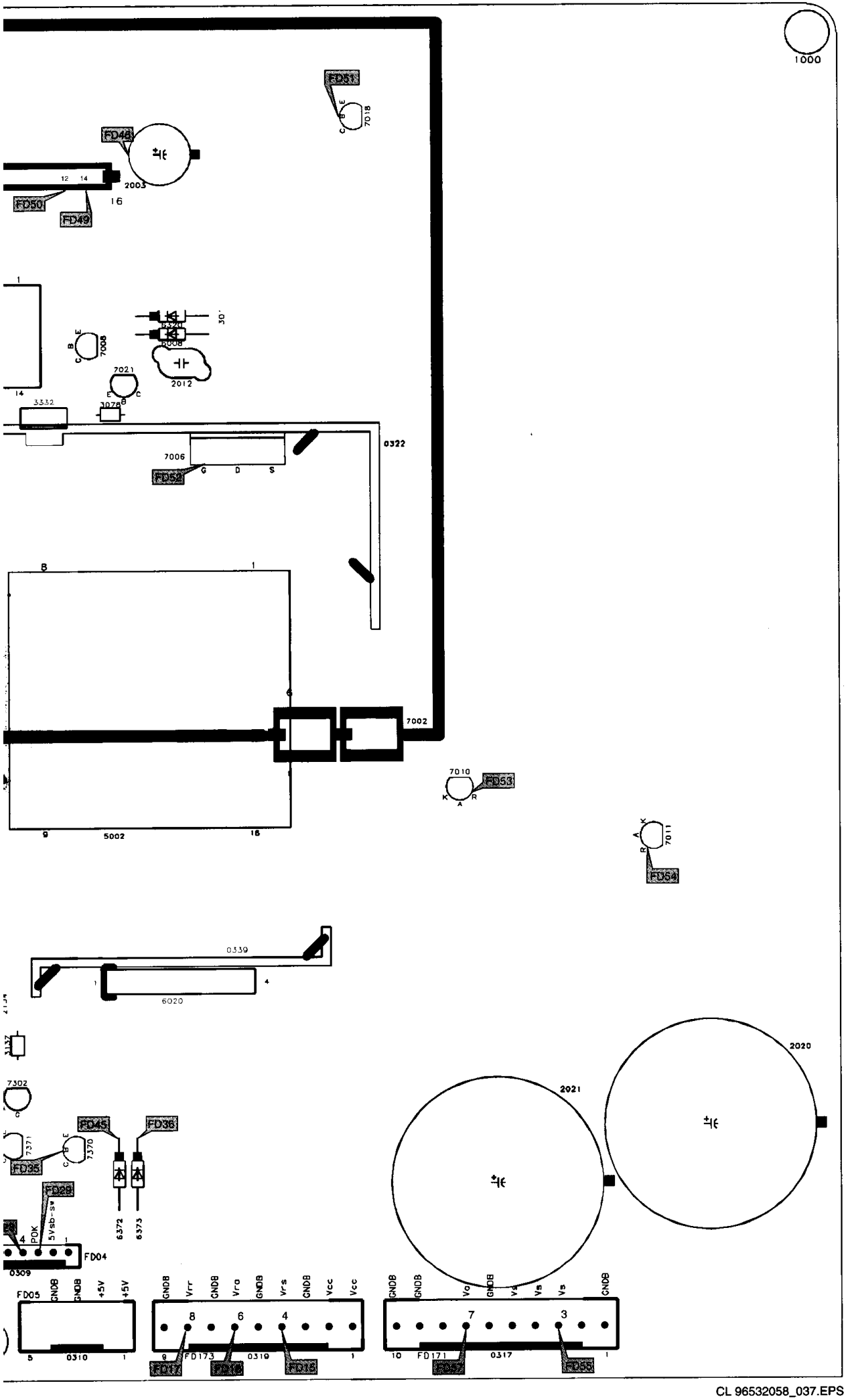
Testpoint overview Preconditioner



CL 965320058_021.EPS
270899

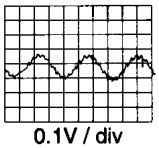
Testpoint overview VsVa Supply

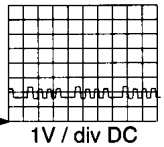


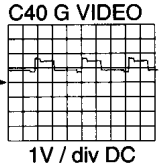


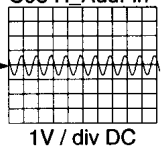
CL 96532058_037.EPS
240899

Oscillograms

A1 PIN4-7540

0.1V / div
0.2ms / div

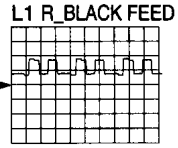
C3 Bin VGA

1V / div DC
10µs / div

C40 G VIDEO

1V / div DC
10µs / div

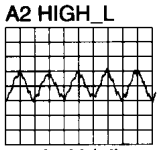
C98 R_Aud.-in

1V / div DC
1ms / div

FD12 +2V5 DC
FD13 +2V5 DC
FD18 +5V DC
FD22 0V2 DC
FD23 +5V DC
FD24 0V
FD25 +8V6 DC
FD28 +5V DC
FD31 +4V6 DC
FD32 +5V DC
FD34 +13V DC
FD36 +7V DC

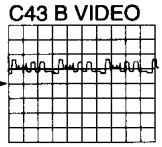
FD53 +2V5 DC
FD54 +2V5 DC
FD55 +180V DC
FD57 +65V DC
FD58 +5V5 DC

L1 R_BLACK FEED

1V / div DC
10µs / div

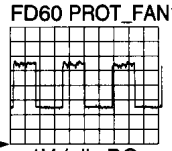
L26 +
L27 +

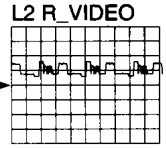
A2 HIGH_L

50mV / div
0.2ms / div

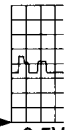
C7 +5V DC

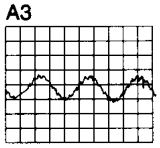
C43 B VIDEO

1V / div DC
10µs / div

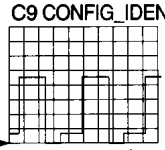
C103 +4V DC
C104 +4V DC
C108 +4V DC
C109 +4V DC

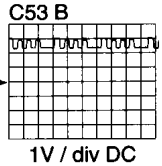
FD60 PROT_FAN1

1V / div DC
5ms / div

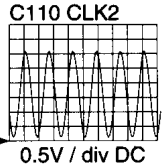
L2 R_VIDEO

1V / div DC
10µs / div

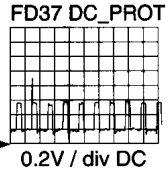
L28 V

0.5V
10

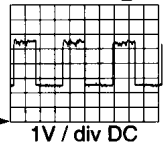
A3

0.1V / div
0.2ms / div

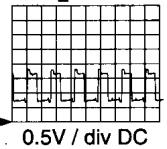
C9 CONFIG_IDENT

1V / div DC
0.1s / div

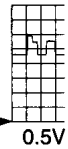
C53 B

1V / div DC
10µs / div

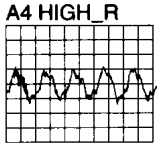
C110 CLK2

0.5V / div DC
2ms / div

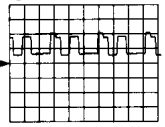
FD37 DC_PROT

0.2V / div DC
10µs / div

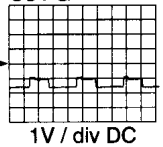
FD61 PROT_FAN2

1V / div DC
5ms / div

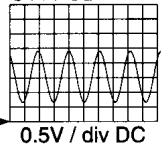
L4 G_BLACK FEED

0.5V / div DC
20µs / div

L29 7

0.5V
10

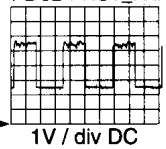
A4 HIGH_R

50mV / div
0.5ms / div

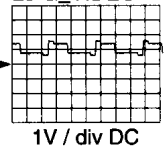
C17 R-out

1V / div DC
10µs / div

C54 G

1V / div DC
10µs / div

C111 CLK1

0.5V / div DC
2ms / div

FD38 -18V DC
FD39 +4V8 DC
FD40 +18V DC
FD41 +5V DC
FD46 +17V DC

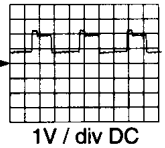
FD62 PROT_FAN3

1V / div DC
5ms / div

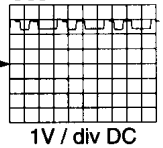
L5 G_VIDEO

1V / div DC
10µs / div

L30 7

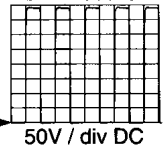
0.5V
10

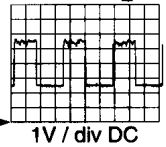
A11 +4V DC
A12 +4V DC
A14 +4V DC
A15 +4V DC

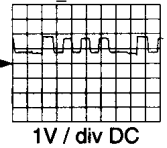
C18 G-out

1V / div DC
10µs / div

C55 R

1V / div DC
10µs / div

FD1 +380V DC
FD3 +10V DC
FD4 +19V DC
FD5 +18V DC

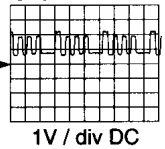
FD47 7005-G

50V / div DC
5µs / div

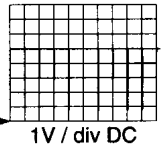
FD63 PROT_FAN4

1V / div DC
5ms / div

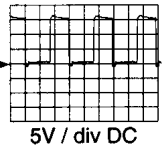
L6 B_BLACK FEED

1V / div DC
10µs / div

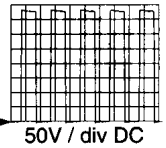
L31 0

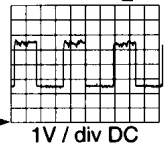
0.5V
50

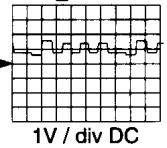
C19 B-out

1V / div DC
10µs / div

C70 SDA

1V / div DC
0.5s / div

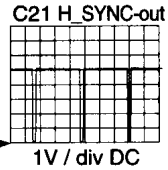
FD6 PIN14-7101

5V / div DC
5µs / div

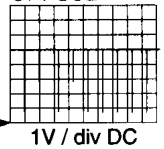
FD48 PIN11-5001

50V / div DC
5µs / div

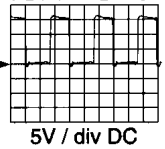
FD64 PROT_FAN5

1V / div DC
5ms / div

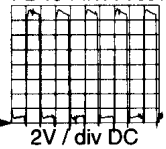
L7 B_VIDEO

1V / div DC
10µs / div

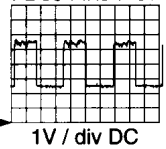
L32 +
L40 +
L41 +

C21 H_SYNC-out

1V / div DC
10µs / div

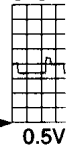
C71 SCL

1V / div DC
0.5s / div

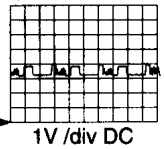
FD7 PIN12-7101

5V / div DC
5µs / div

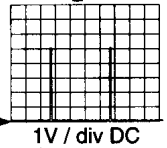
FD49 PIN14-7001

2V / div DC
2µs / div

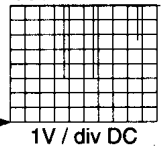
FD65 PIN8-7101

1V / div DC
5ms / div

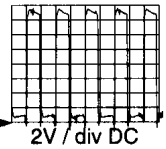
L8 +4V5 DC
L9 +5V DC
L10 +5V DC

L42 V

0.5V
10

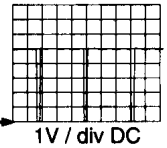
C1 Rin VGA

1V /div DC
10µs / div

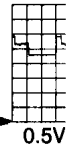
C22 V_SYNC-out

1V / div DC
5ms / div

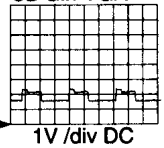
C93 DATA

1V / div DC
0.5s / div

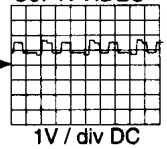
FD50 PIN12-7001

2V / div DC
2µs / div

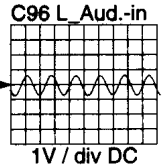
FD66 +5V DC
FD67 +2V5 DC

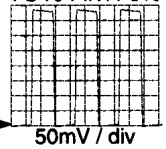
L13 H

1V / div DC
10µs / div

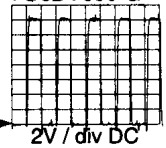
L43 7

0.5V
10

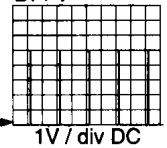
C2 Gin VGA

1V /div DC
10µs / div

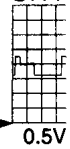
C37 R VIDEO

1V / div DC
10µs / div

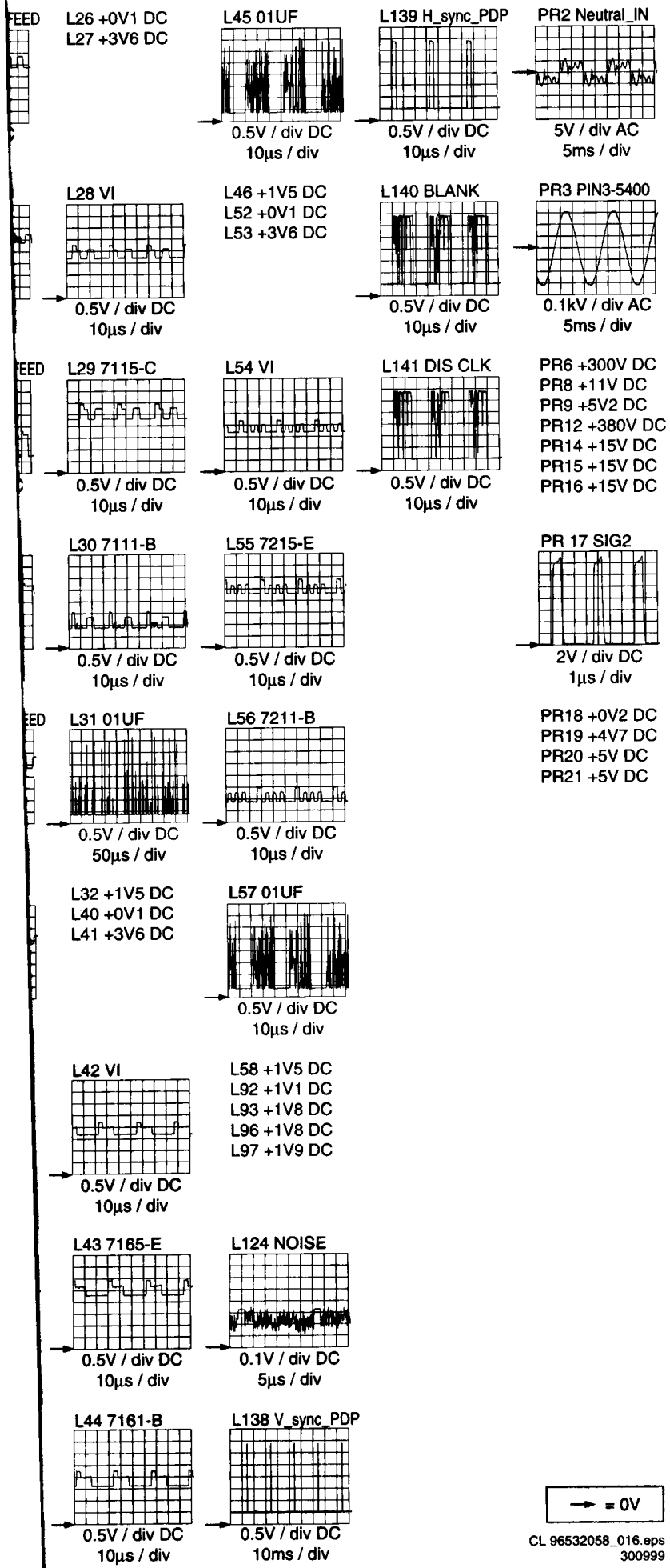
C96 L_Aud.-in

1V / div DC
0.2ms / div

FD10 PIN11-5101

50mV / div
5µs / div

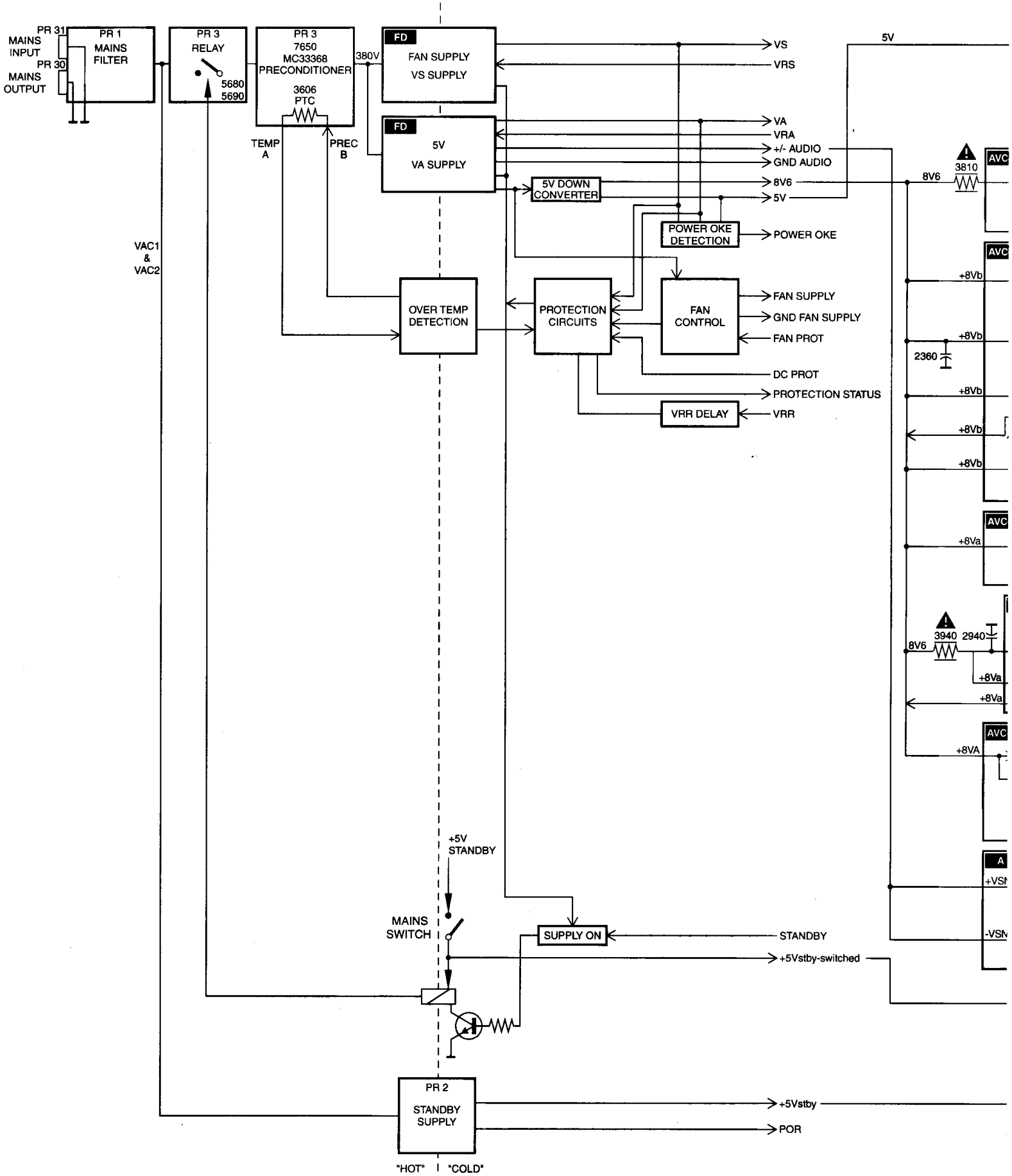
FD52 7006-G

2V / div DC
5µs / div

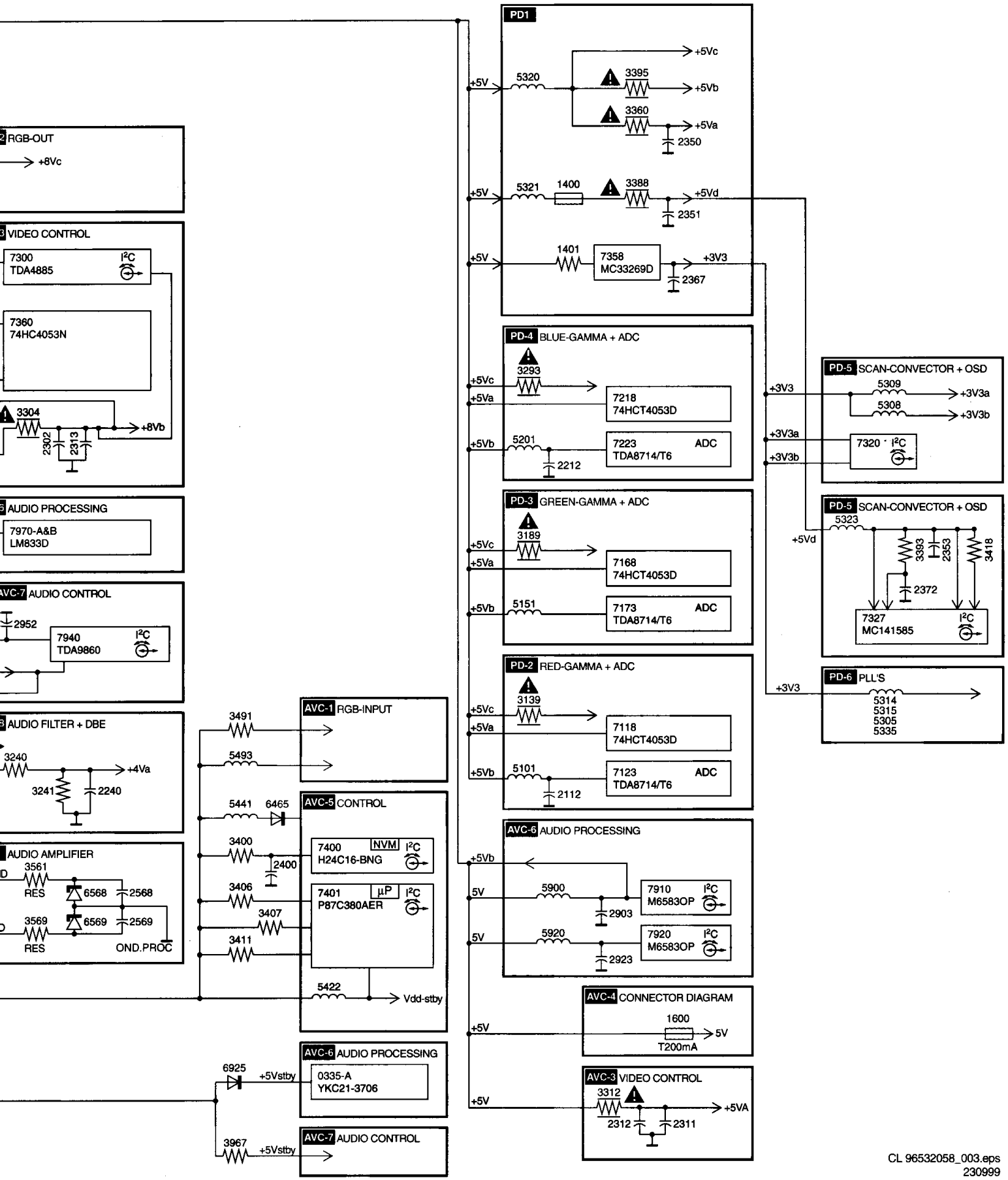
L14 V

1V / div DC
10µs / div

L44 7

0.5V
10


FEED
L26 +0V1 DC
L27 +3V6 DC
L45 01UF
0.5V / div DC
10µs / div
L139 H_sync_PDP
0.5V / div DC
10µs / div
PR2 Neutral_IN
5V / div AC
5ms / div
L28 VI
0.5V / div DC
10µs / div
L46 +1V5 DC
L52 +0V1 DC
L53 +3V6 DC
L140 BLANK
0.5V / div DC
10µs / div
PR3 PIN3-5400
0.1kV / div AC
5ms / div
FEED
L29 7115-C
0.5V / div DC
10µs / div
L54 VI
0.5V / div DC
10µs / div
L141 DIS CLK
0.5V / div DC
10µs / div
PR6 +300V DC
PR8 +11V DC
PR9 +5V2 DC
PR12 +380V DC
PR14 +15V DC
PR15 +15V DC
PR16 +15V DC
L30 7111-B
0.5V / div DC
10µs / div
L55 7215-E
0.5V / div DC
10µs / div
PR 17 SIG2
2V / div DC
1µs / div
EED
L31 01UF
0.5V / div DC
50µs / div
L56 7211-B
0.5V / div DC
10µs / div
PR18 +0V2 DC
PR19 +4V7 DC
PR20 +5V DC
PR21 +5V DC
L32 +1V5 DC
L40 +0V1 DC
L41 +3V6 DC
L57 01UF
0.5V / div DC
10µs / div
L42 VI
0.5V / div DC
10µs / div
L58 +1V5 DC
L92 +1V1 DC
L93 +1V8 DC
L96 +1V8 DC
L97 +1V9 DC
L43 7165-E
0.5V / div DC
10µs / div
L124 NOISE
0.1V / div DC
5µs / div
L44 7161-B
0.5V / div DC
10µs / div
L138 V_sync_PDP
0.5V / div DC
10ms / div
= 0V
CL 96532058_016.eps
300999

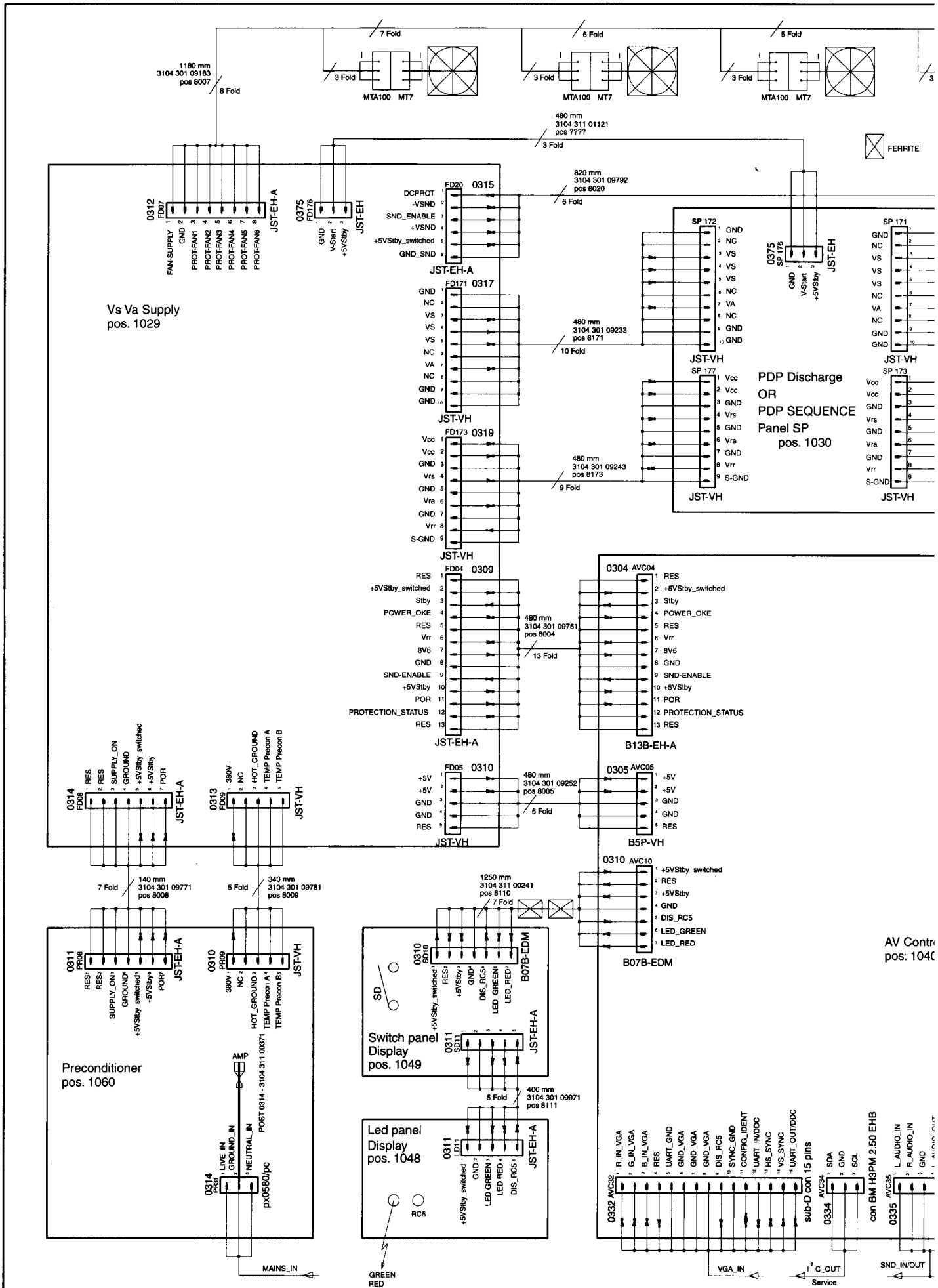
Supply voltage diagram

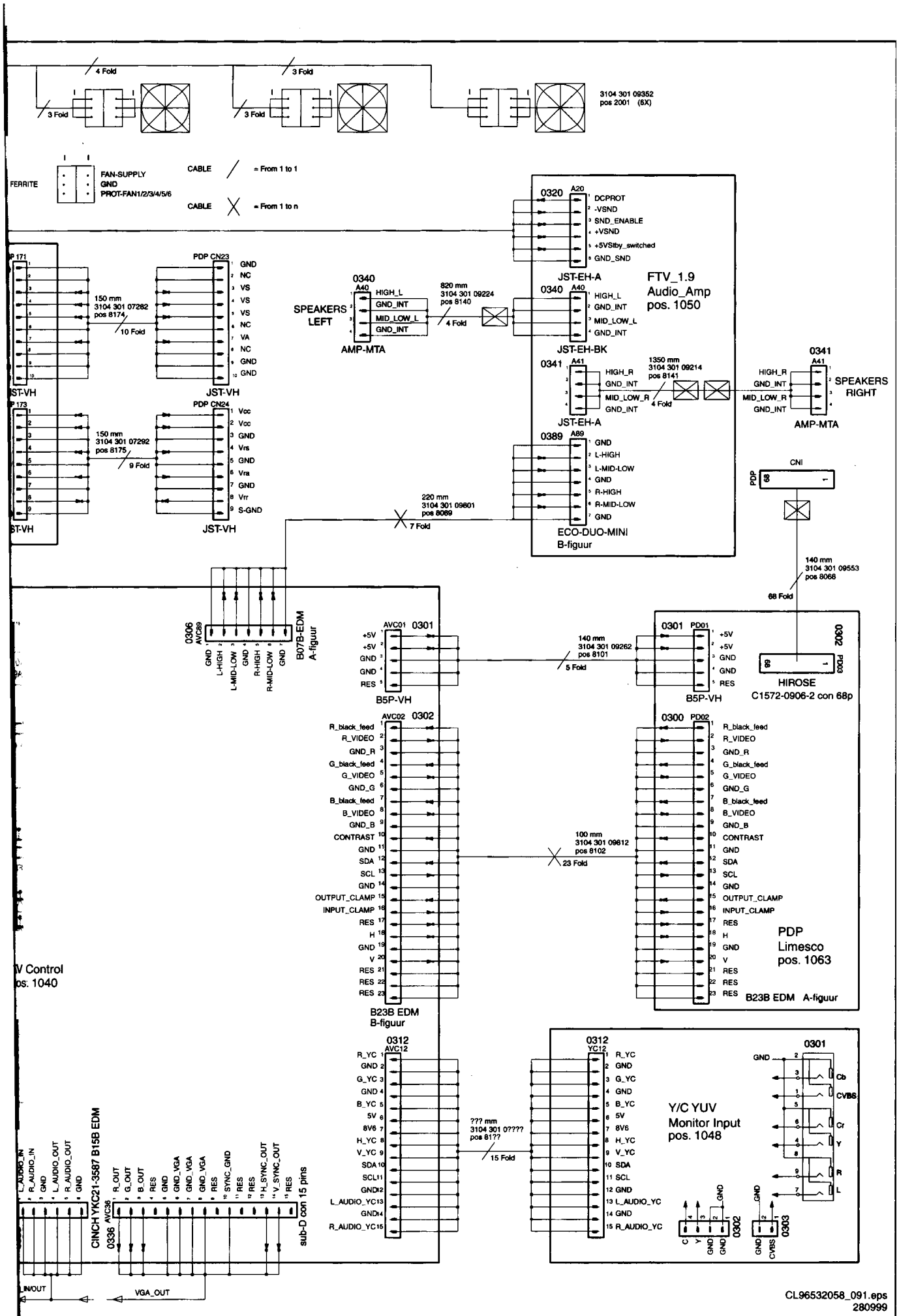




CL 96532058_003.eps
230999

Wiring diagram

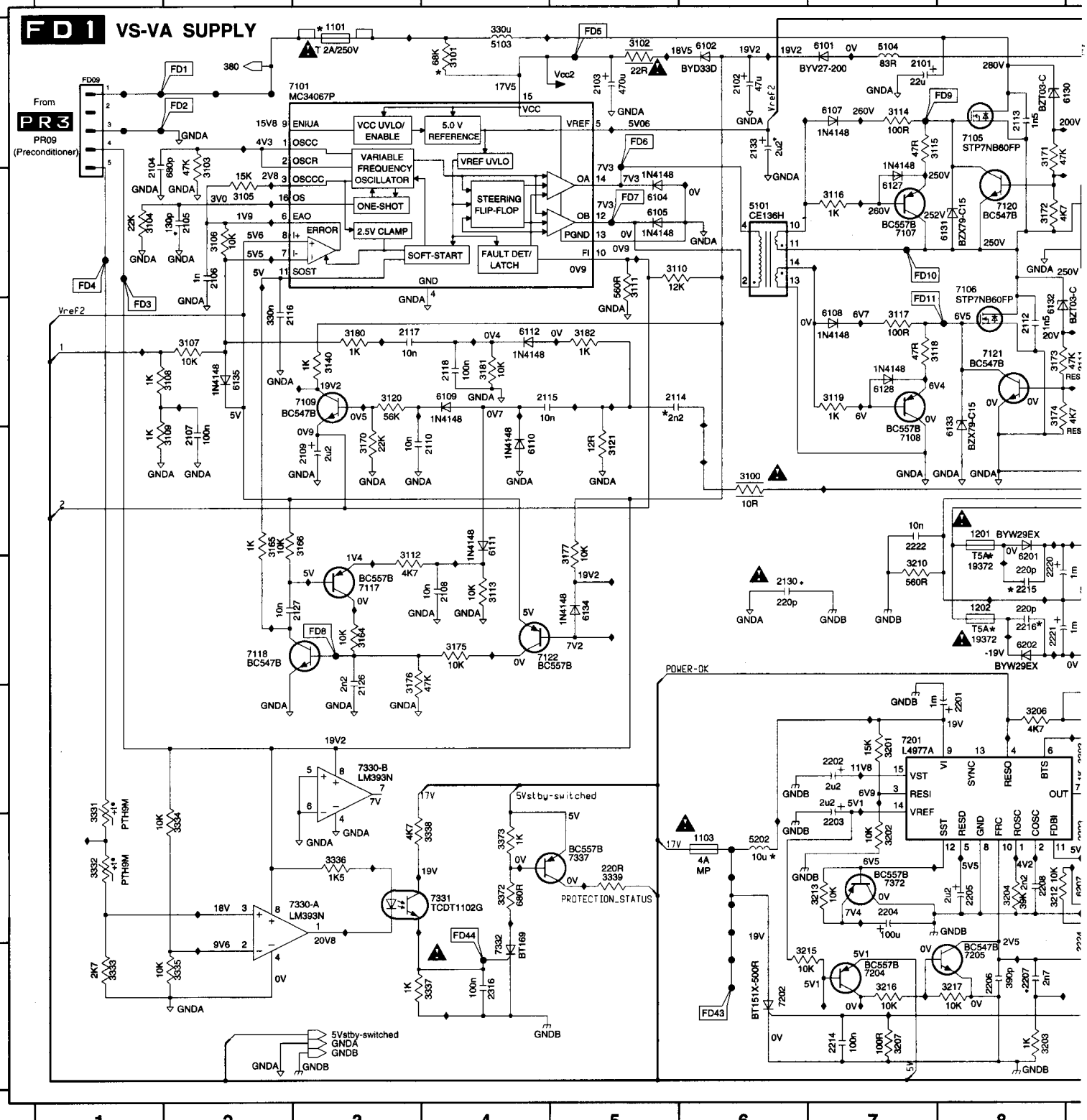


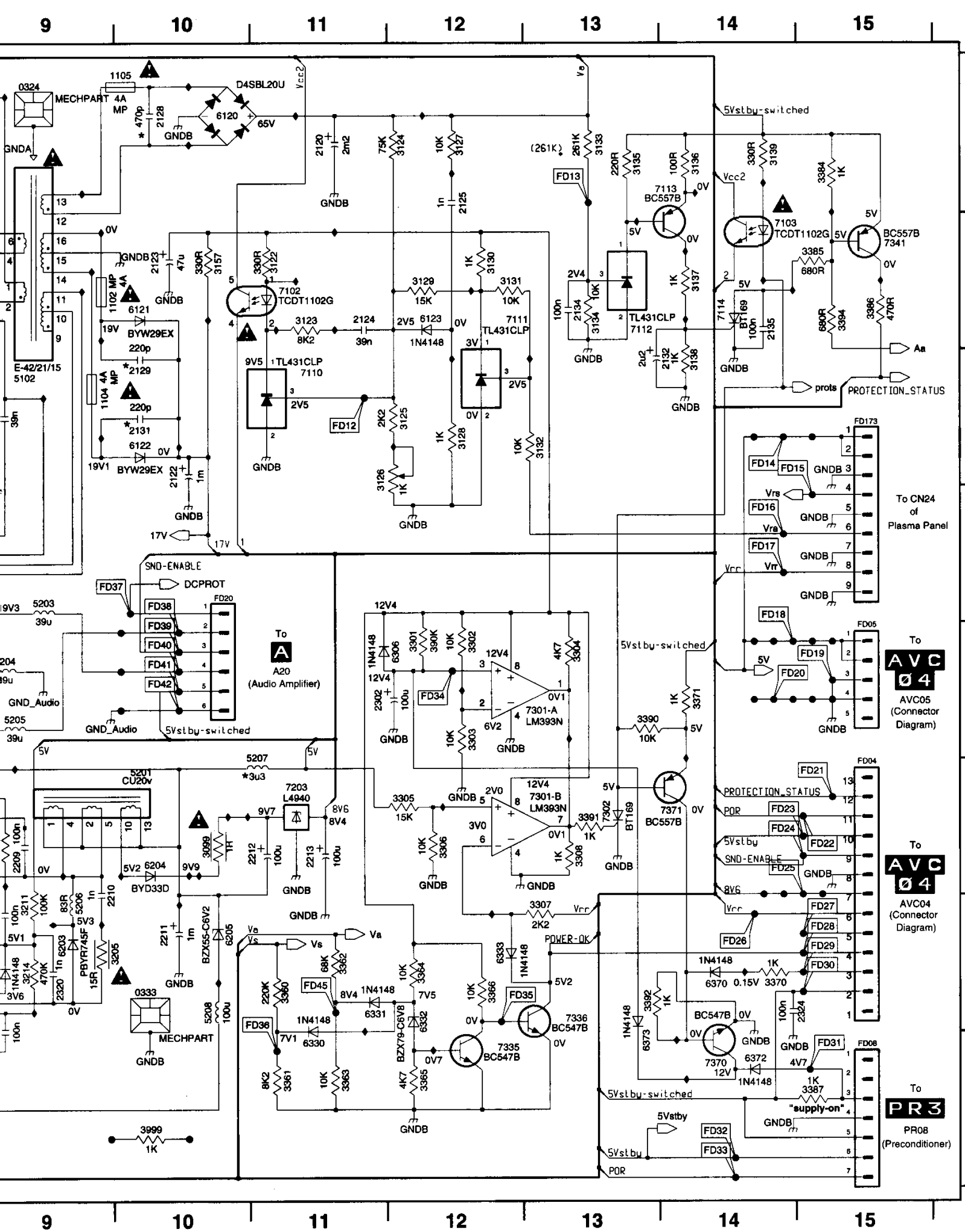

4 Fold
3 Fold
3 Fold
3 Fold
3104 301 09352
pos 2001 (6X)
FERRITE
FAN-SUPPLY
GND
PROT-FAN1/2/3/4/5/6
CABLE = From 1 to 1
CABLE = From 1 to n
0320 A20
DCPROT
-VSND
SND_ENABLE
+VSND
+5VStby_switched
GND_SND
JST-EH-A
FTV_1.9
Audio_Amp
pos. 1050
SPEAKERS LEFT
0340 A40
HIGH_L
GND_INT
MID_LOW_L
GND_INT
820 mm
3104 301 09224
pos 8140
4 Fold
AMP-MTA
JST-EH-BK
0341 A41
HIGH_R
GND_INT
MID_LOW_R
GND_INT
1350 mm
3104 301 09214
pos 8141
4 Fold
SPEAKERS RIGHT
AMP-MTA
0389 A89
GND
L-HIGH
L-MID-LOW
GND
R-HIGH
R-MID-LOW
GND
220 mm
3104 301 09801
pos 8089
7 Fold
ECO-DUO-MINI
B-figuur
CNI
PDP
68
140 mm
3104 301 09553
pos 8068
68 Fold
P 171
150 mm
3104 301 07282
pos 8174
10 Fold
PDP CN23
GND
NC
VS
VS
VS
NC
VA
NC
GND
GND
JST-VH
P 173
150 mm
3104 301 07292
pos 8175
9 Fold
PDP CN24
Vcc
Vcc
GND
Vns
GND
Vra
GND
Vrr
S-GND
JST-VH
0306 AVC09
GND
L-HIGH
L-MID-LOW
GND
R-HIGH
R-MID-LOW
GND
B07B-EDM
A-figuur
AVC01 0301
+5V
+5V
GND
GND
RES
B5P-VH
140 mm
3104 301 09262
pos 8101
5 Fold
0301 PD01
+5V
+5V
GND
GND
RES
B5P-VH
0302 PD03
HIROSE
C1572-0906-2 con 68p
AVC02 0302
R_black_feed
R_VIDEO
GND_R
G_black_feed
G_VIDEO
GND_G
B_black_feed
B_VIDEO
GND_B
CONTRAST
GND
SDA
SCL
GND
OUTPUT_CLAMP
INPUT_CLAMP
RES
H
GND
V
RES
RES
RES
B23B EDM
B-figuur
100 mm
3104 301 09612
pos 8102
23 Fold
0300 PD02
R_black_feed
R_VIDEO
GND_R
G_black_feed
G_VIDEO
GND_G
B_black_feed
B_VIDEO
GND_B
CONTRAST
GND
SDA
SCL
GND
OUTPUT_CLAMP
INPUT_CLAMP
RES
H
GND
V
RES
RES
RES
PDP
Limesco
pos. 1063
B23B EDM A-figuur
V Control
os. 1040
0312 AVC12
R_YC
GND
G_YC
GND
B_YC
5V
8V6
H_YC
V_YC
SDA
SCL
GND
L_AUDIO_YC
GND
R_AUDIO_YC
??? mm
3104 301 0????
pos 81??
15 Fold
0312 YC12
R_YC
GND
G_YC
GND
B_YC
5V
8V6
H_YC
V_YC
SDA
SCL
GND
L_AUDIO_YC
GND
R_AUDIO_YC
Y/C YUV
Monitor Input
pos. 1048
0301
GND
Cb
CVBS
Cr
Y
R
L
0302
C
Y
GND
GND
0303
GND
CVBS
L_AUDIO_IN
R_AUDIO_IN
GND
L_AUDIO_OUT
R_AUDIO_OUT
GND
CINCH YKC21-3587 B15B EDM
0336 AVC36
R_OUT
G_OUT
B_OUT
RES
GND
GND_VGA
GND_VGA
GND_VGA
RES
SYNC_GND
RES
RES
H_SYNC_OUT
V_SYNC_OUT
RES
sub-D con 15 pins
LIN/OUT
VGA_OUT
CL96532058_091.eps
280999

7. Electrical diagrams and print layouts

VsVa supply (FD)

0309 G15 2103 A5 2122 C10 2204 G7 2224 G9 3111 B5 3128 C12 3170 D3 3207 H7 3331 F1 3371 E14 5201 F10 6112 C4 6205 G10 7109 C3 7301-B
0310 E15 2104 A1 2123 B10 2205 G8 2302 E11 3112 E3 3129 B12 3171 A8 3210 E7 3332 G1 3372 G4 5202 G6 6120 A10 6207 G9 7110 C11 7302 F
0313 A1 2105 B2 2124 B11 2206 H8 2316 H4 3113 E4 3130 B12 3172 B8 3211 G9 3333 H1 3373 G4 5203 D9 6121 B10 6306 E12 7111 B12 7330-A
0314 H15 2106 B2 2125 A12 2207 H8 2320 G9 3114 A7 3131 B12 3173 C8 3212 G8 3334 G2 3379 B15 5204 E9 6122 C10 6330 H11 7112 B13 7330-B
0315 D10 2107 D2 2126 F3 2208 G8 2324 G15 3115 A7 3132 C13 3174 C8 3213 G7 3335 H2 3384 A15 5205 E9 6123 B12 6331 G11 7113 A13 7331 G
0319 C15 2108 E4 2127 E3 2209 F9 3099 F10 3116 B7 3133 A13 3175 E4 3214 G9 3336 G3 3385 B15 5206 G9 6127 B7 6332 G12 7114 B14 7332 H
0324 A9 2109 D3 2128 A10 2210 F9 3100 D6 3117 C7 3134 B13 3176 E3 3215 H6 3337 H4 3386 B15 5207 F11 6128 C7 6333 G12 7117 E3 7335 H
0333 G10 2110 D4 2129 C10 2211 G10 3101 A4 3118 C7 3135 A13 3177 D5 3216 H7 3338 G4 3387 H15 5208 G10 6130 A8 6370 G14 7118 E2 7336 G
1101 A3 2111 C9 2130 E6 2212 F11 3102 A5 3119 C7 3136 A14 3180 C3 3217 H8 3339 G5 3390 E13 6101 A7 6131 B8 6372 H14 7120 B8 7337 G
1102 B9 2112 C8 2131 C10 2213 F11 3103 A2 3120 C3 3137 B14 3181 C4 3301 E12 3360 G11 3391 F13 6102 A6 6132 C8 6373 H13 7121 C8 7341 B
1103 G6 2113 A8 2132 C14 2214 H7 3104 B1 3121 D5 3138 C14 3182 C5 3302 E12 3361 H11 3392 G13 6104 B5 6133 D8 7101 A2 7122 E5 7370 H
1104 C9 2114 C5 2133 A6 2215 E8 3105 B2 3122 B11 3139 A14 3201 F7 3303 E12 3362 G11 3393 F9 6105 B5 6134 E5 7102 B11 7201 F7 7371 F
1105 A10 2115 C4 2134 B13 2216 E8 3106 B2 3123 B11 3140 C3 3202 G7 3304 E13 3363 H11 3999 H10 6107 A7 6135 C2 7103 B15 7202 H6 7372 G
1201 D8 2116 C2 2135 B14 2220 E8 3107 C2 3124 A12 3157 B10 3203 H8 3305 F12 3364 G12 5101 B6 6108 C7 6201 E8 7105 A8 7203 F11
1202 E8 2117 C3 2201 F8 2221 E8 3108 C2 3125 C12 3164 E3 3204 G8 3306 F12 3365 H12 5102 C9 6109 C4 6202 E8 7106 B8 7204 H7
2101 A7 2118 C4 2202 F7 2222 D7 3109 D2 3126 D11 3165 D2 3205 G9 3307 G13 3366 G12 5103 A4 6110 D4 6203 G9 7107 B7 7205 H8
2102 A6 2120 A11 2203 G7 2223 G9 3110 B5 3127 A12 3166 D3 3206 F8 3308 F13 3370 G14 5104 A7 6111 D4 6204 F10 7108 D7 7301-A E13

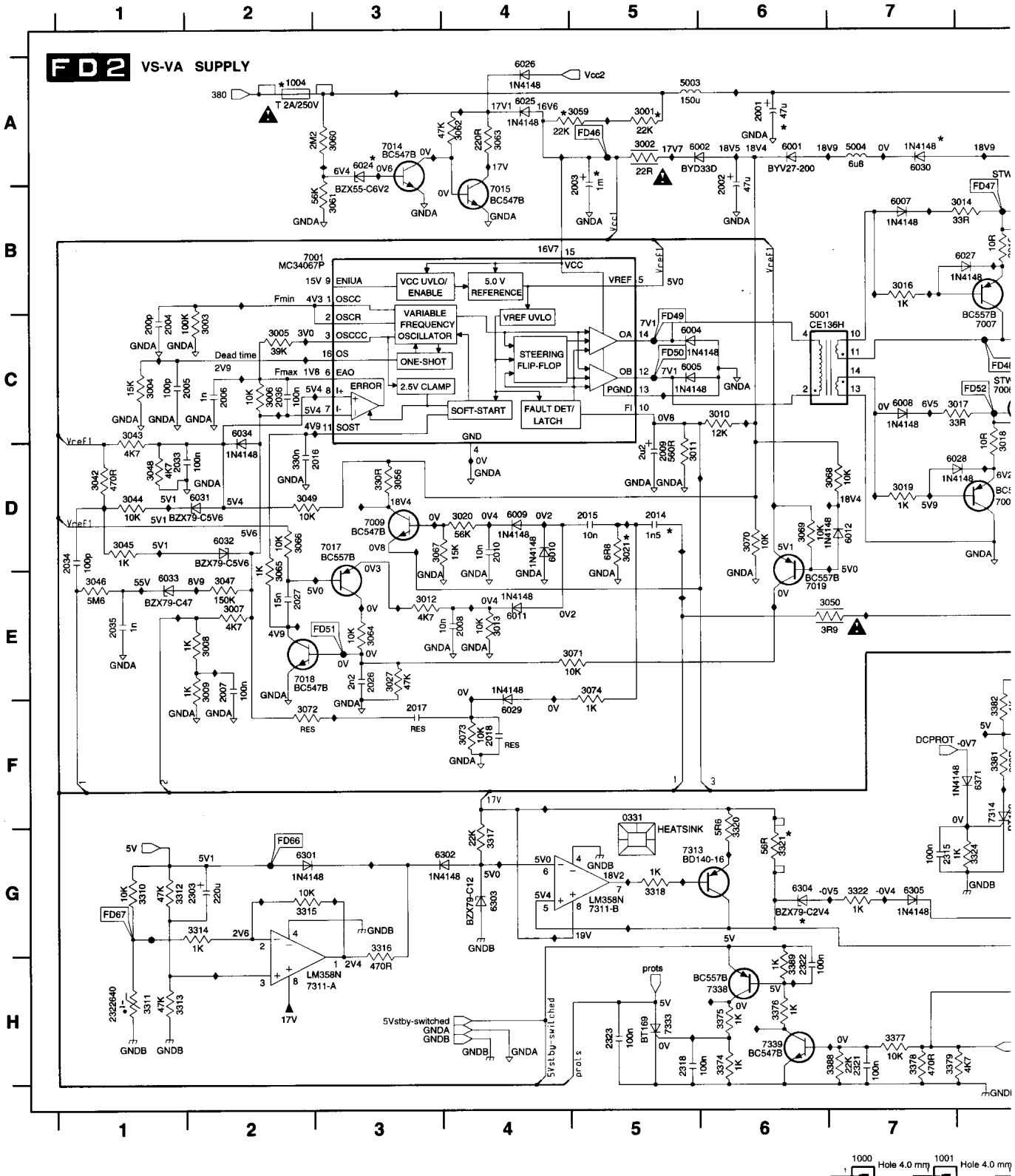




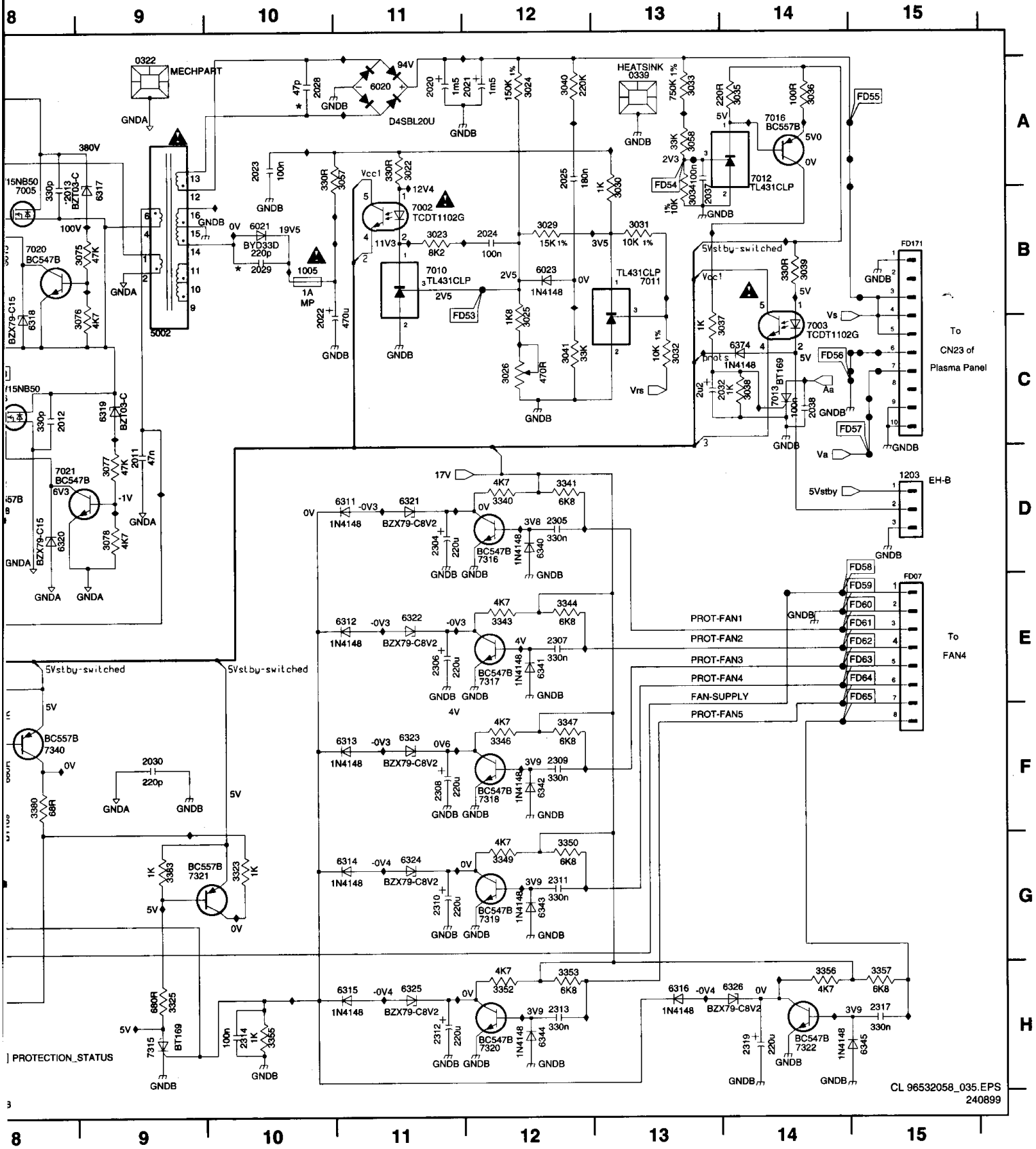
CL 96532058_034.EPS
240899

VsVa supply (FD)

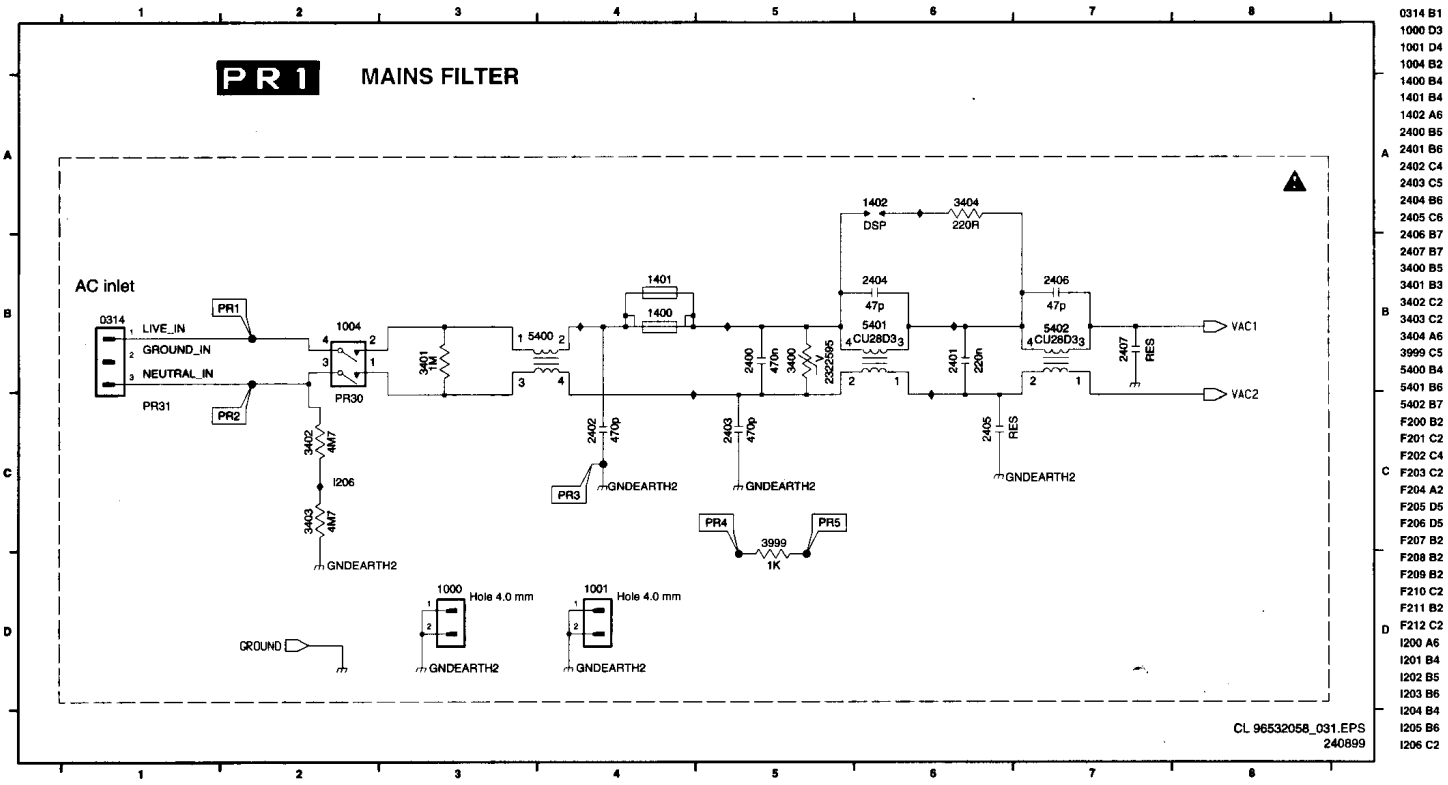
0312 E15	2009 D5	2026 E3	2307 E12	3002 A5	3018 D8	3035 A14	3056 D3	3072 F2	3320 G6	3355 H10	5002 C9	6024 A3	6311 D11
0317 B15	2010 D4	2027 E2	2308 F11	3003 C2	3019 D7	3036 A14	3057 A11	3073 F4	3321 G6	3356 H14	5003 A5	6025 A4	6312 E11
0318 D15	2011 D9	2028 A10	2309 F12	3004 C1	3020 D4	3037 C13	3058 A13	3074 E5	3322 G7	3357 H15	5004 A7	6026 A4	6313 F11
0322 A9	2012 C8	2029 B10	2310 G11	3005 C2	3021 D5	3038 C14	3059 A5	3075 B9	3323 G10	3374 H6	6001 A6	6027 B8	6314 G11
0331 F5	2013 B8	2030 F9	2311 G12	3006 C2	3022 A11	3039 B14	3060 A3	3076 C9	3324 G8	3375 H6	6002 A6	6028 D8	6315 H11
0339 A13	2014 D5	2032 C14	2312 H11	3007 E2	3023 B11	3040 A12	3061 B3	3077 D9	3325 H9	3376 H6	6004 C5	6029 F4	6316 H13
1004 A2	2015 D5	2033 D1	2313 H12	3008 E2	3024 A12	3041 C12	3062 A4	3078 D9	3340 D12	3377 H7	6005 C5	6030 A7	6317 B9
1005 B10	2016 D2	2034 D1	2314 H10	3009 E2	3025 C12	3042 D1	3063 A4	3310 G1	3341 D12	3378 H7	6007 B7	6031 D2	6318 C8
2001 A6	2017 F3	2035 E1	2315 G7	3010 C6	3026 C12	3043 C1	3064 E3	3311 H1	3343 E12	3379 H7	6008 C7	6032 D2	6319 C9
2002 B6	2018 F4	2036 C2	2317 H15	3011 D5	3027 E3	3044 D1	3065 E2	3312 G1	3344 E12	3380 F8	6009 D4	6033 E1	6320 D8
2003 B5	2020 A11	2037 B13	2318 H5	3012 E3	3029 B12	3045 D1	3066 D2	3313 H1	3346 F12	3381 F8	6010 D4	6034 C2	6321 D11
2004 C1	2021 A12	2038 C14	2319 H14	3013 E4	3030 B13	3046 E1	3067 D3	3314 G2	3347 F12	3382 F8	6011 E4	6301 G2	6322 E11
2005 C1	2022 C10	2303 G2	2321 H7	3014 B8	3031 B13	3047 E2	3068 D7	3315 G2	3349 G12	3383 G9	6012 D7	6302 G4	6323 F11
2006 C2	2023 A10	2304 D11	2322 H6	3015 B8	3032 C13	3048 D1	3069 D6	3316 G3	3350 G12	3388 H7	6020 A11	6303 G4	6324 G11
2007 E2	2024 B12	2305 D12	2323 H5	3016 B7	3033 A13	3049 D2	3070 D6	3317 G4	3352 H12	3389 H6	6021 B10	6304 G6	6325 H11
2008 E4	2025 A12	2306 E11	3001 A5	3017 C8	3034 B13	3050 E7	3071 E5	3318 G5	3353 H12	5001 C6	6023 B12	6305 G7	6326 H14



0 D12	7010 B11	7315 H9
1 E12	7011 B13	7316 D12
2 F12	7012 A14	7317 E12
3 G12	7013 C14	7318 F12
4 H12	7014 A3	7319 G12
5 H15	7015 B4	7320 H12
1 F8	7016 A14	7321 G9
4 C14	7017 D3	7322 H14
1 B2	7018 E3	7333 H5
2 B11	7019 E6	7338 H6
3 C14	7020 B8	7339 H6
5 B8	7021 D8	7340 F8
6 C8	7311-A H2	
7 C8	7311-B G5	
8 D8	7313 G5	
9 D3	7314 F8	

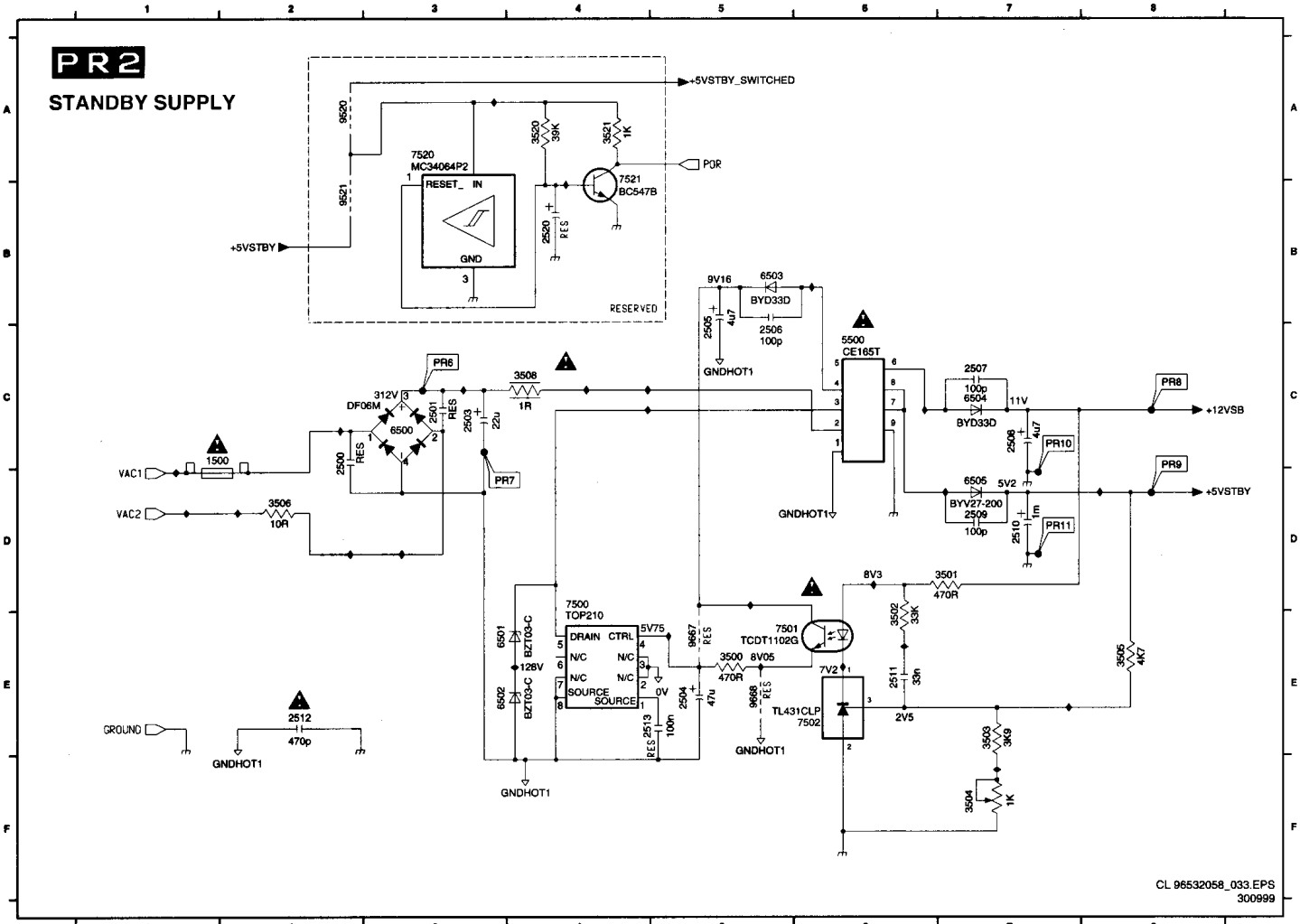


Pre conditioner (PR)



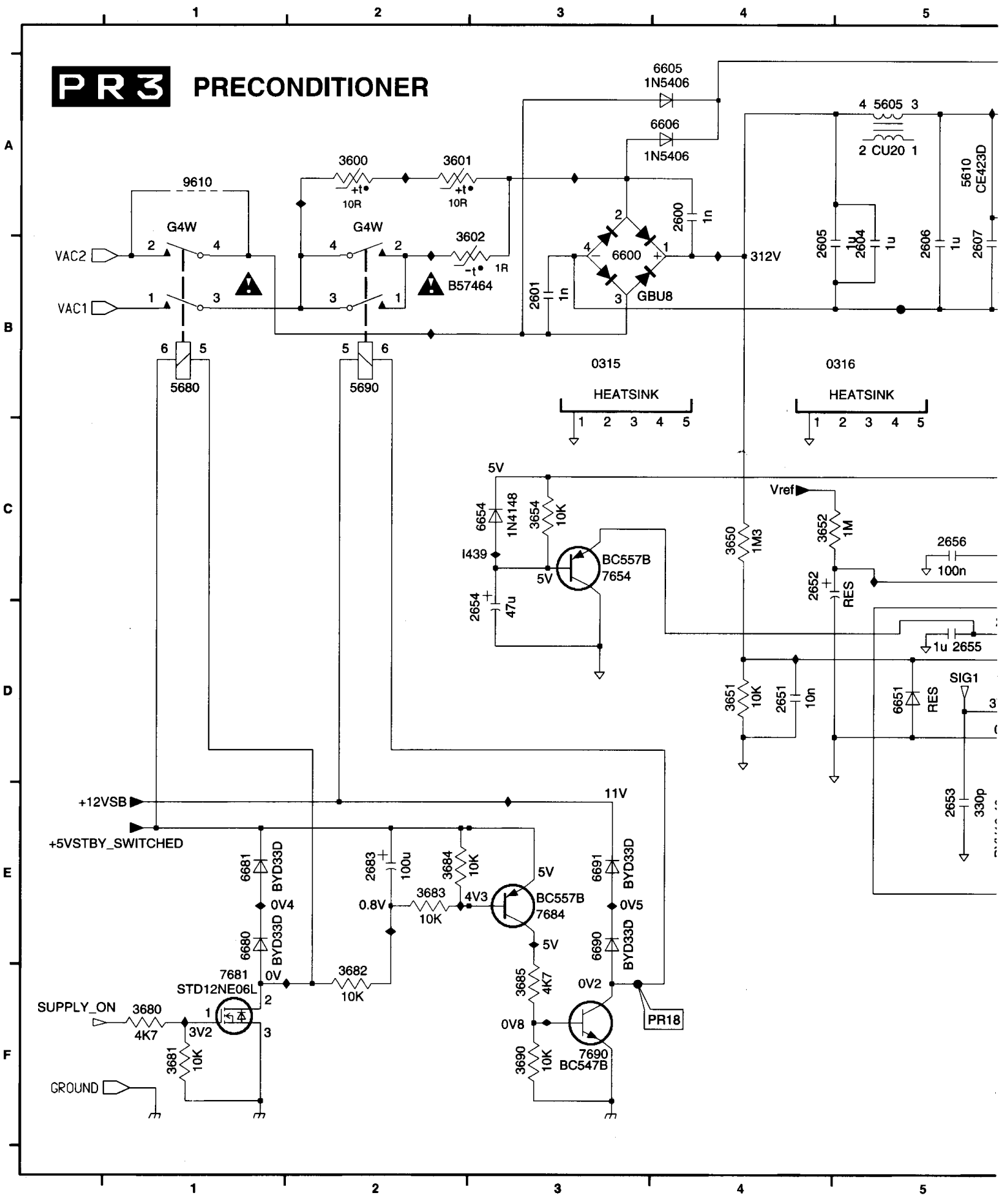
0314 B1
1000 D3
1001 D4
1004 B2
1400 B4
1401 B4
1402 A6
2400 B5
2401 B6
2402 C4
2403 C5
2404 B6
2405 C6
2406 B7
2407 B7
3400 B5
3401 B3
3402 C2
3403 C2
3404 A6
3999 C5
5400 B4
5401 B6
5402 B7
F200 B2
F201 C2
F202 C4
F203 C2
F204 A2
F205 D5
F206 D5
F207 B2
F208 B2
F209 B2
F210 C2
F211 B2
F212 C2
I200 A6
I201 B4
I202 B5
I203 B6
I204 B4
I205 B6
I206 C2

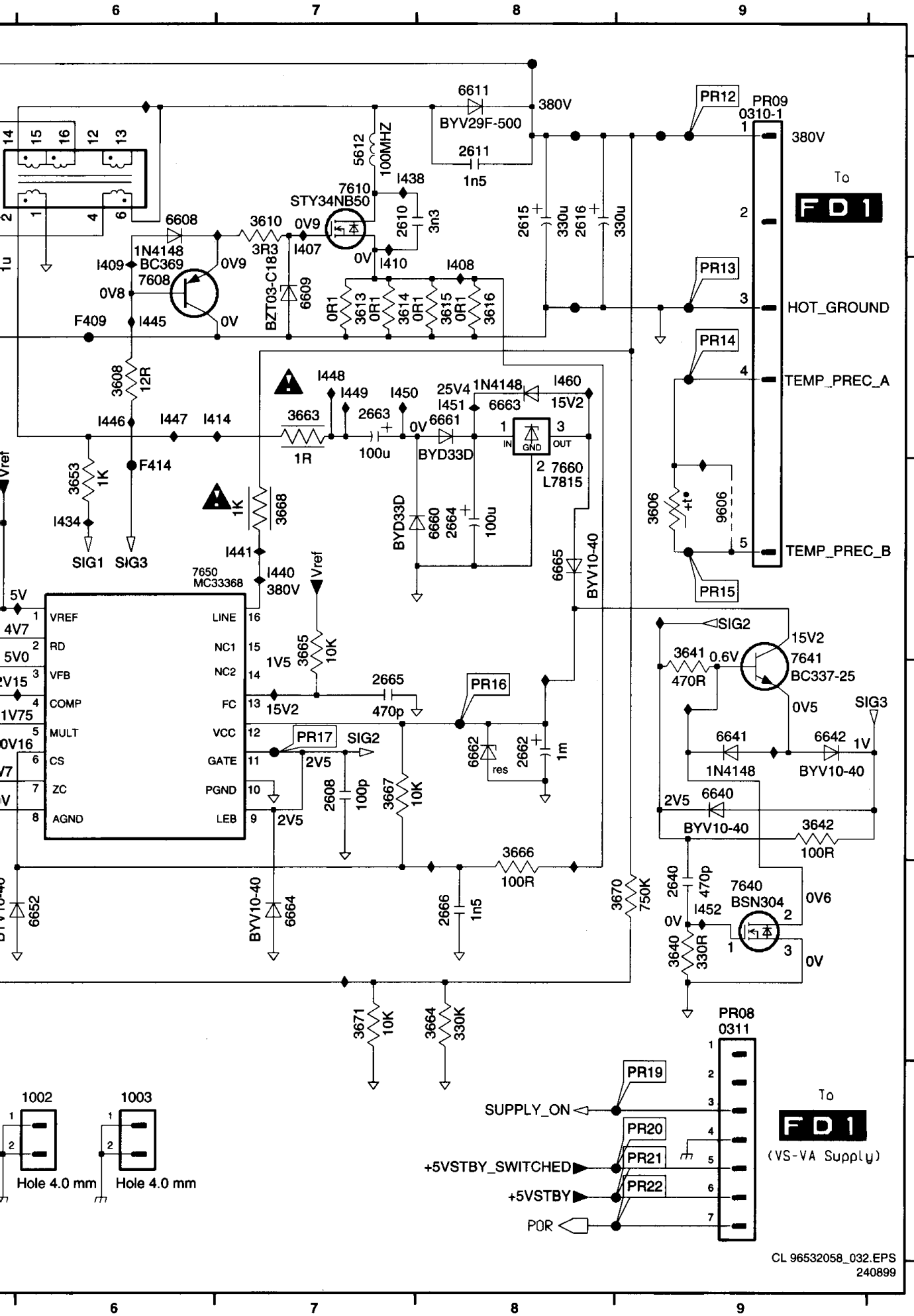
Pre conditioner (PR)



1500 C1
2500 C2
2501 C3
2503 C3
2504 E5
2505 C5
2506 C5
2507 C7
2508 C7
2509 D7
2510 D7
2511 E6
2512 E2
2513 E5
2520 B4
3500 E5
3501 D7
3502 E6
3503 E7
3504 F7
3505 E8
3506 D2
3508 C4
3520 A4
3521 A4
5500 C6
6500 C3
6501 E3
6502 E3
6503 B5
6504 C7
6505 D7
7500 D4
7501 E6
7502 E5
7520 A4
7521 B4
9520 A2
9521 B2
9667 E5
9668 E5
F300 C3
F301 C8
F302 D8
F303 C7
F304 D7
F305 C3
I300 A3
I301 A4
I303 C4
I304 C6
I306 C2
I307 C4
I308 C1
I309 B6
I310 D7
I311 E3
I312 D6
I314 D5
I316 E5
I317 E5
I318 E6
I319 E7
I320 F7
I321 D1
I322 D3
I323 D2
I324 C4
I325 C3
I326 D2
I327 D8

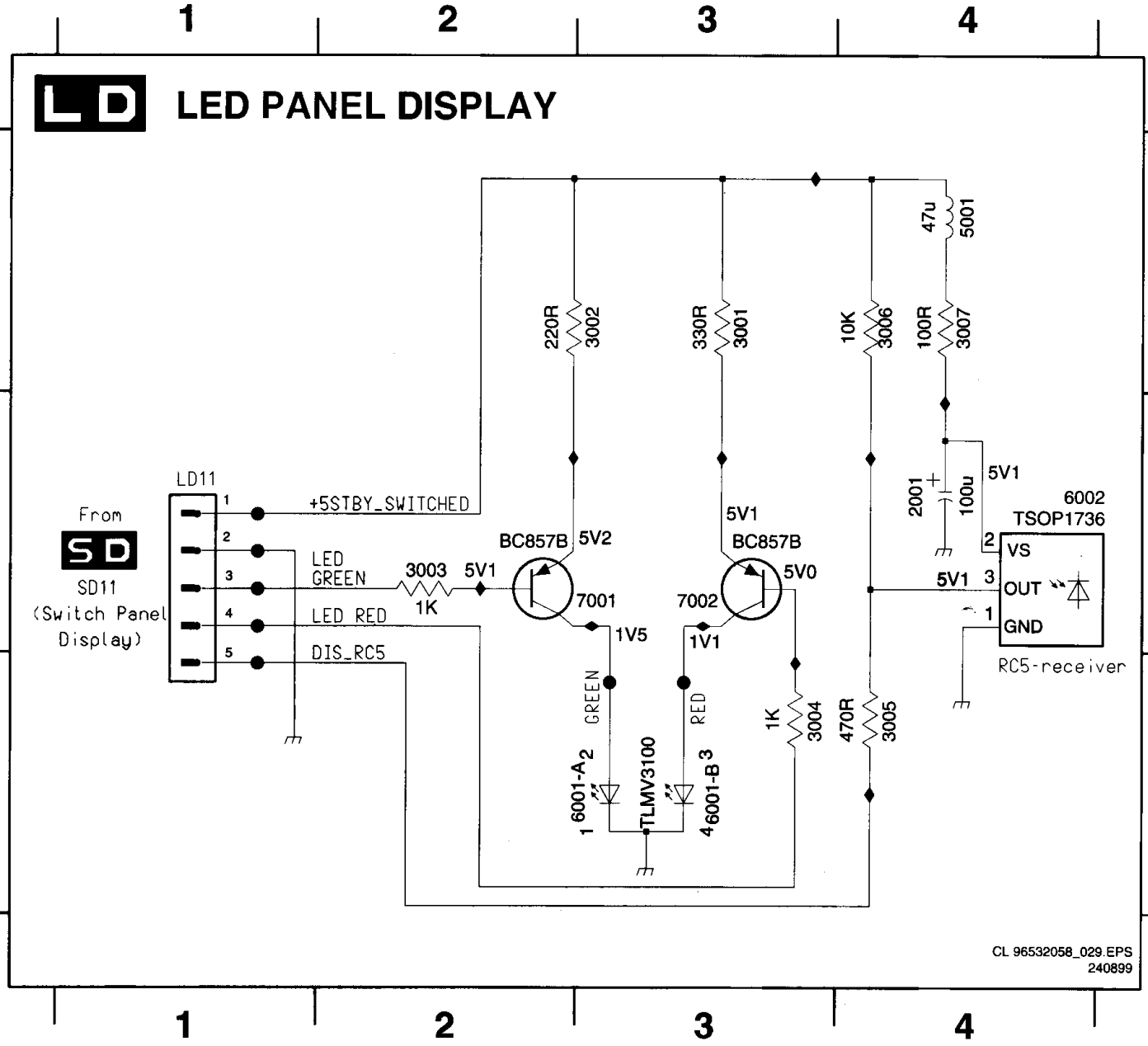
Pre conditioner (PR)



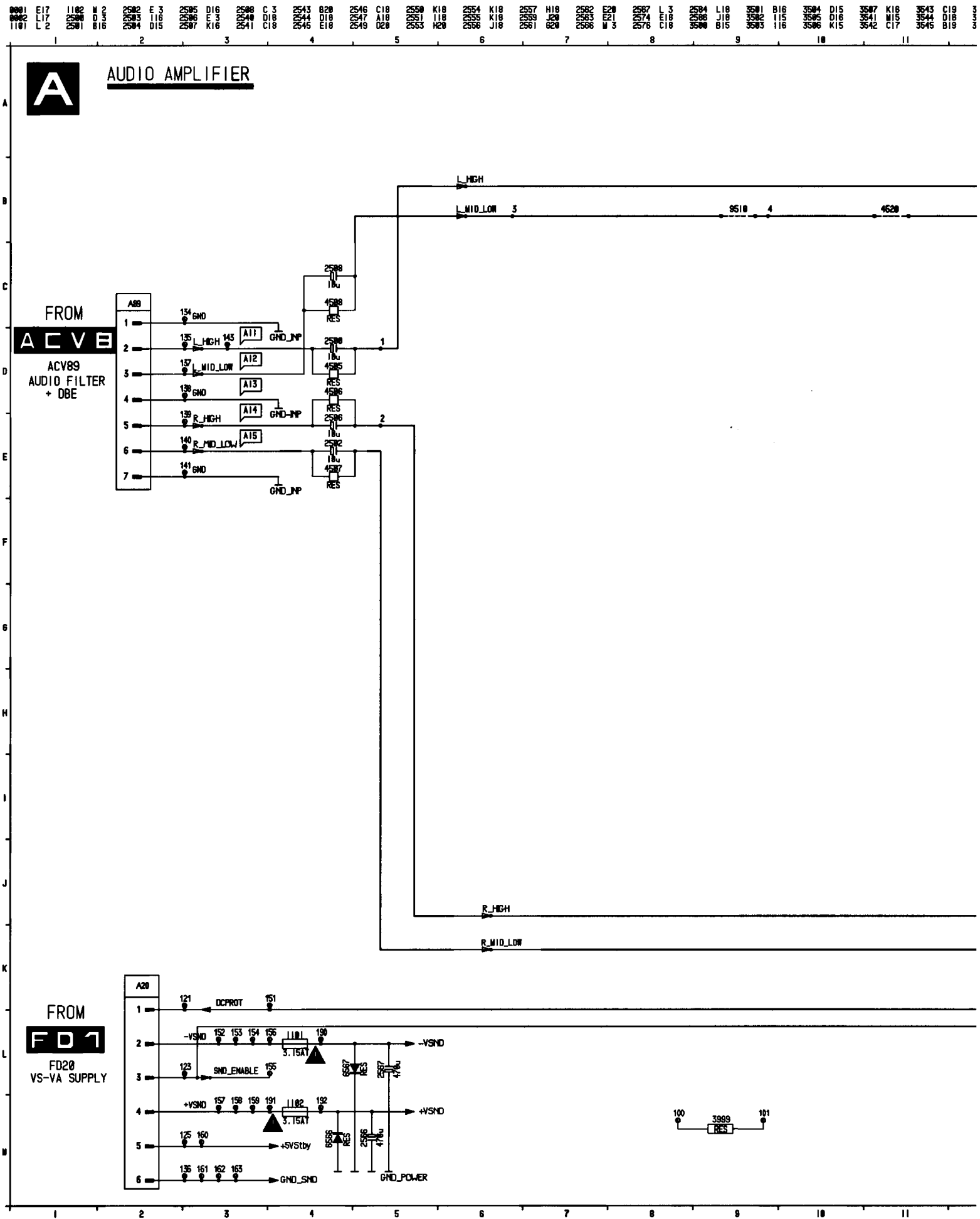


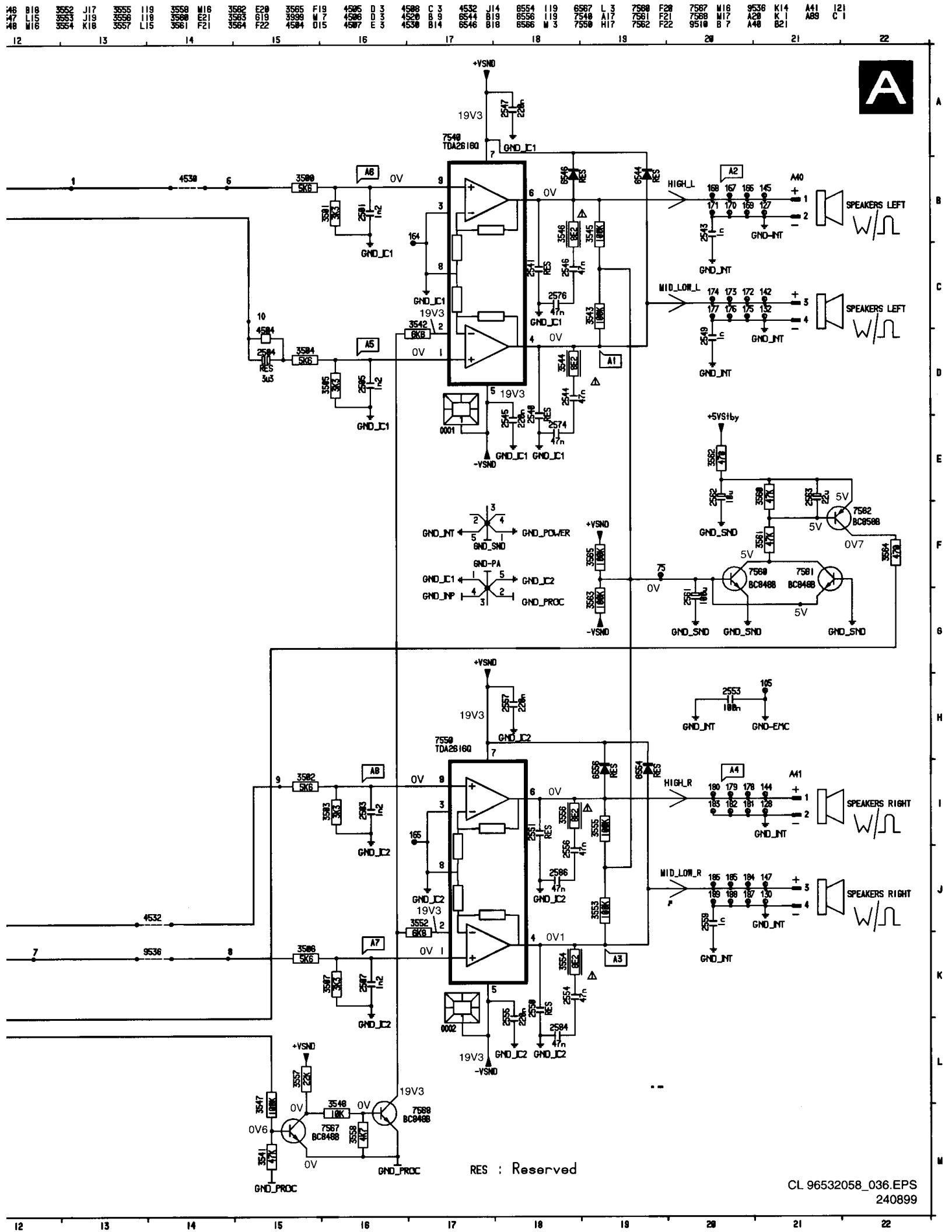
0310-1 A9
0311 E9
0315 B3
0316 B5
1002 F6
1003 F6
2600 A4
2601 B3
2604 B5
2605 B4
2606 B5
2607 B5
2608 D7
2610 A7
2611 A8
2615 A8
2616 A8
2640 E9
2651 D4
2652 C4
2653 E5
2654 D3
2655 D5
2656 C5
2662 D8
2663 B7
2664 C8
2665 D7
2666 E8
2683 E2
3600 A2
3601 A2
3602 B3
3606 C9
3608 B6
3610 A7
3613 B7
3614 B7
3615 B8
3616 B8
3640 E9
3641 C9
3642 D9
3650 C4
3651 D4
3652 C4
3653 C6
3654 C3
3663 B7
3664 E8
3665 C7
3666 D8
3667 D7
3668 C7
3670 E9
3671 E7
3680 F1
3681 F1
3682 F2
3683 E2
3684 E2
3685 F3
3690 F3
5605 A5
5610 A5
5612 A7
5680 B1
5690 B2
6600 B3
6605 A4
6606 A4
6608 A6
6609 B7
6611 A8
6640 D9
6641 D9
6642 D9
6651 D5
6652 E6
6654 C3
6660 C8
6661 B8
6662 D8
6663 B8
6664 E7
6665 C8
6680 E1
6681 E1
6690 E3
6691 E3
7608 B6
7610 A7
7640 E9
7641 D9
7650 C6
7654 C3
7660 C8
7681 F1
7684 E3
7690 F3
9606 C9
9610 A1

LED panel

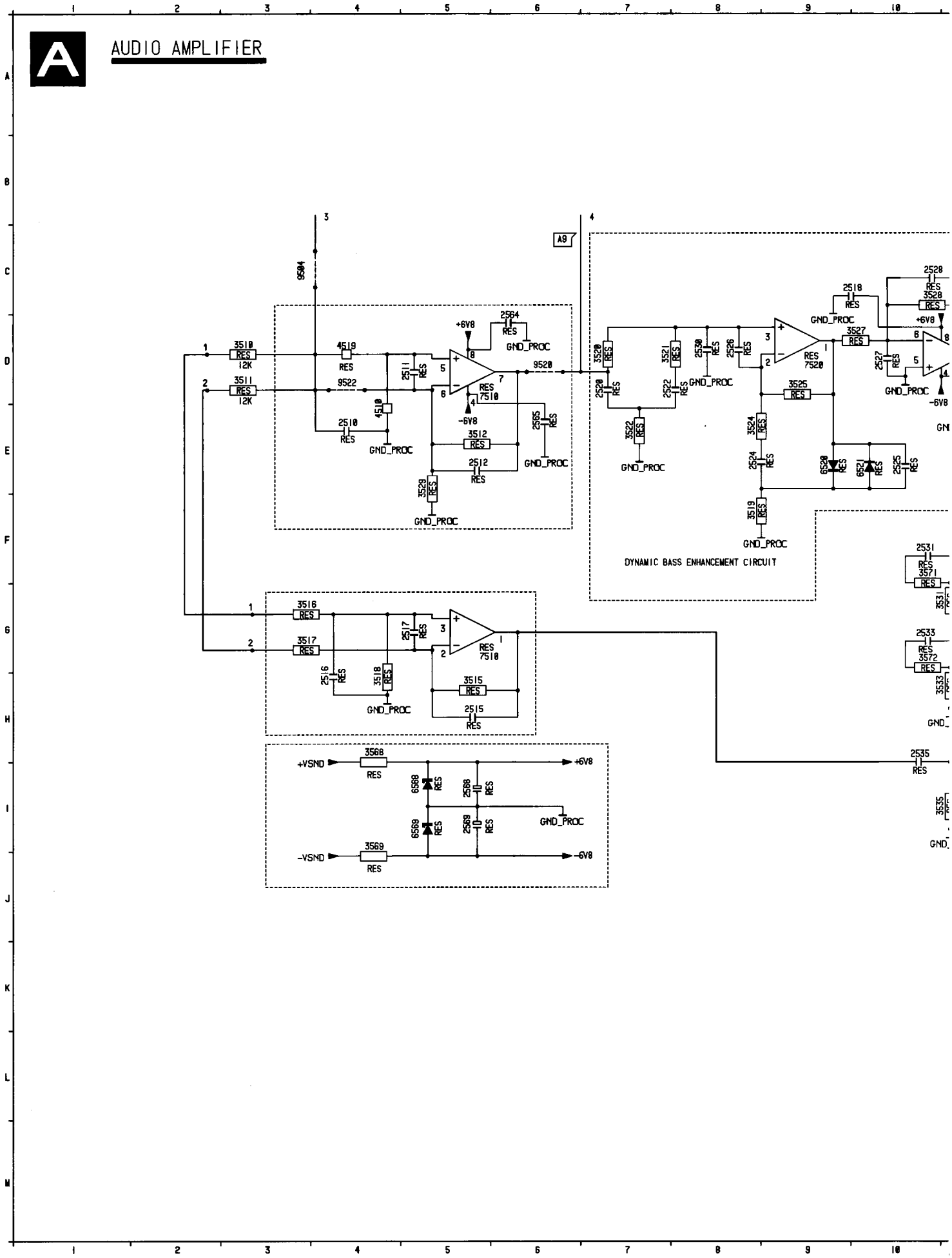

LD
LED PANEL DISPLAY
0311 B1
2001 B4
3002 A3
3004 C3
3005 C3
3006 A3
3007 A4
3008 B2
3009 A2
5001 A4
6001 C2
6001 C3
6002 B4
7001 B2
7002 B3
LD11
From
SD
SD11
(Switch Panel
Display)
+5STBY_SWITCHED
LED
GREEN
LED RED
DIS_RC5
3003
1K
5V1
BC857B
5V2
7001
1V5
5V1
BC857B
5V0
7002
1V1
220R
3002
330R
3001
10K
3006
100R
3007
47u
5001
2001
100u
5V1
6002
TSOP1736
VS
OUT
GND
RC5-receiver
GREEN
RED
6001-A
6001-B
TLMV3100
1K
3004
470R
3005
CL 96532058_029.EPS
240899

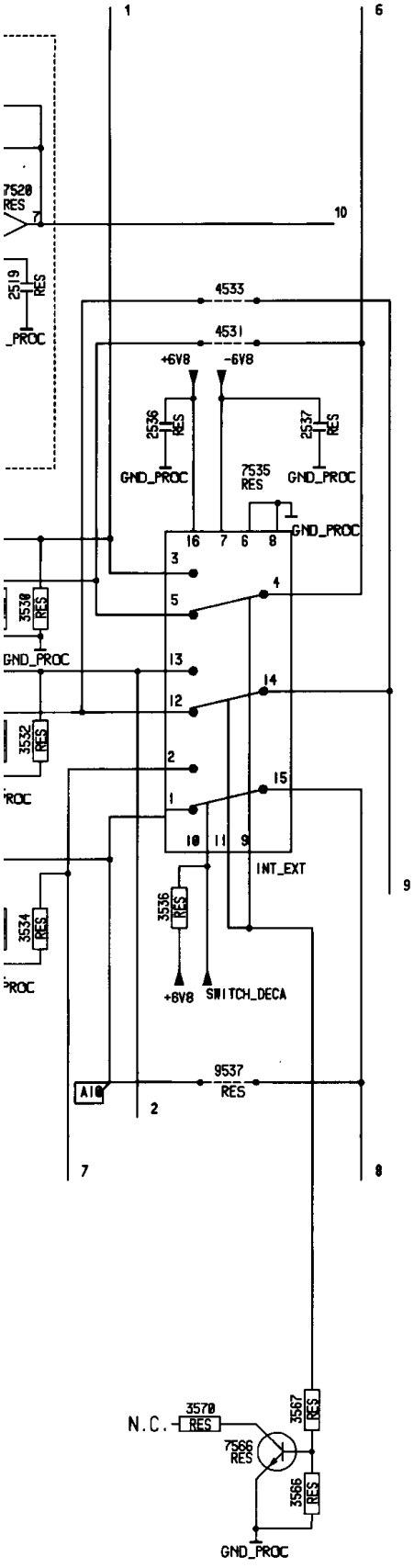
Audio amplifier A1




A
+VSND
19V3
7549
TDA2616Q
GND_IC1
HIGH_L
MID_LOW_L
SPEAKERS LEFT
GND_INT
GND_JC1
-VSND
+5VStby
GND_SND
GND_POWER
GND-PA
GND_PROC
7582
BC858B
7560
BC848B
7561
BC848B
7567
BC848B
7568
BC848B
7550
TDA2616Q
GND_IC2
HIGH_R
MID_LOW_R
SPEAKERS RIGHT
GND-EMC
RES : Reserved
CL 96532058_036.EPS
240899

Audio amplifier A2



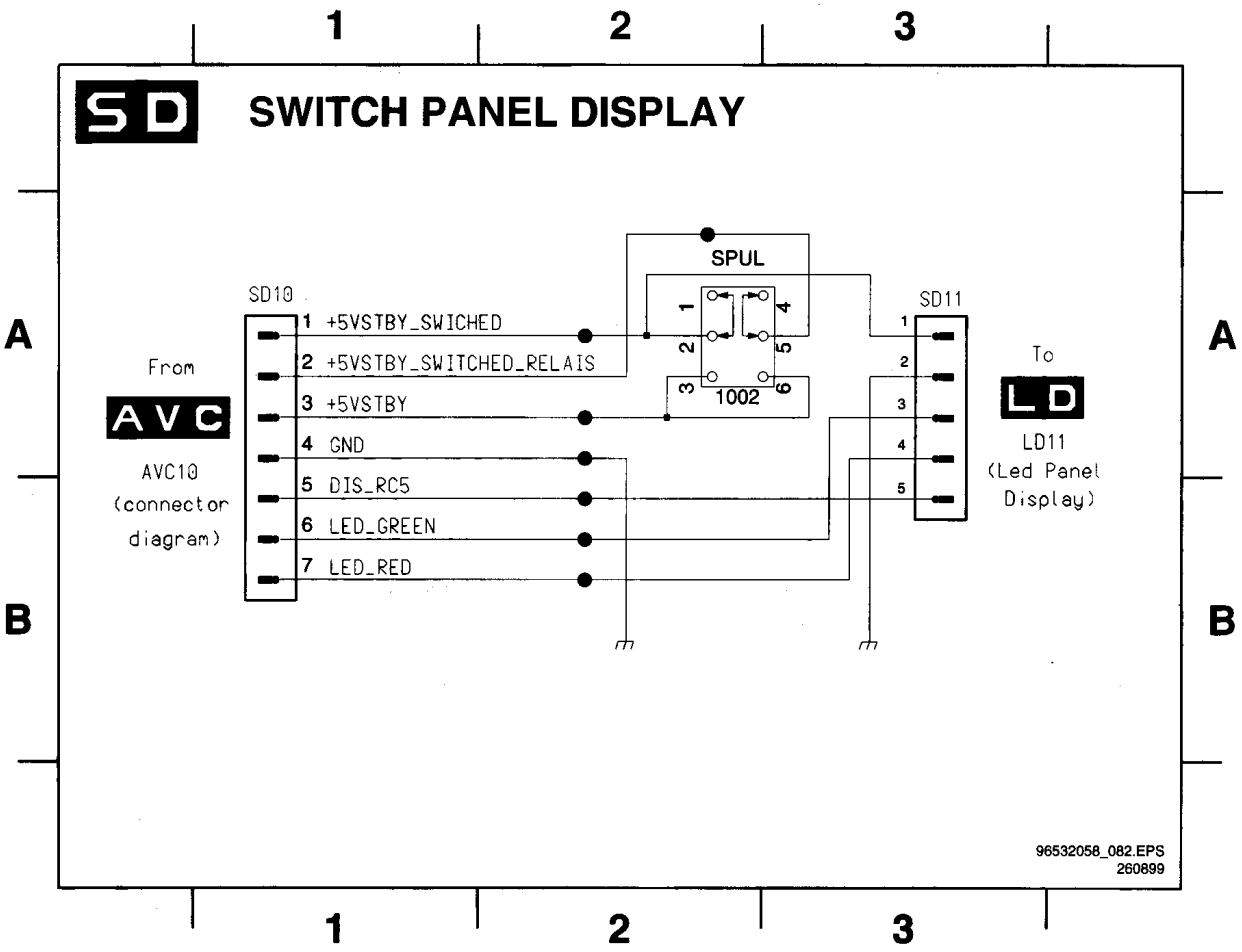


RES : Reserved

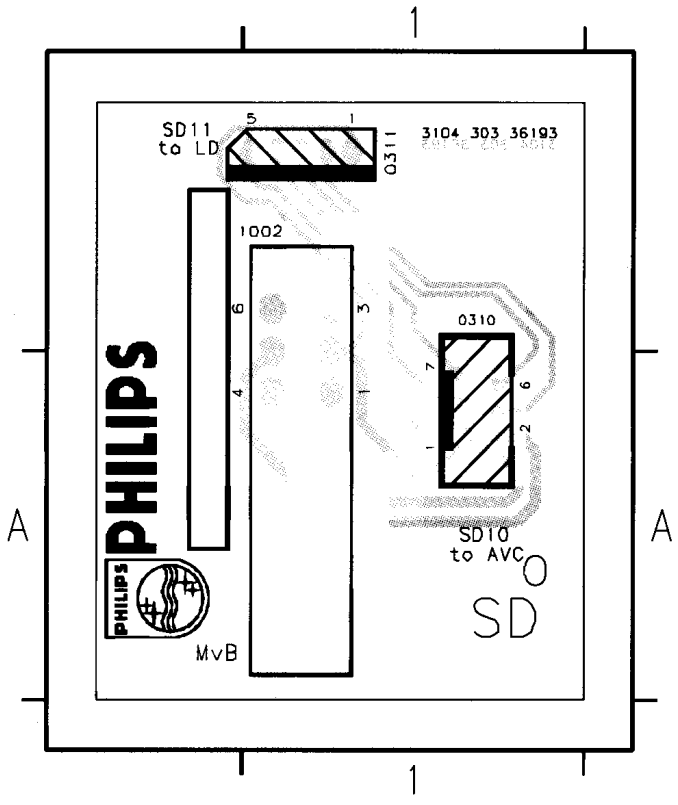
96532058_062.EPS
260899

2510 E 4
2511 D 5
2512 E 5
2515 H 5
2516 H 4
2517 G 5
2518 C10
2519 D11
2520 D 7
2522 D 7
2524 E 8
2525 E10
2526 D 8
2527 D10
2528 C10
2530 D 8
2531 F10
2533 G10
2535 H10
2536 E12
2537 E13
2564 D 6
2565 E 6
2568 I 5
2569 I 5
3510 D 3
3511 D 3
3512 E 5
3515 H 5
3516 G 3
3517 G 3
3518 H 4
3519 F 8
3520 D 7
3521 D 7
3522 E 7
3524 E 8
3525 D 9
3527 D10
3528 C10
3529 E 5
3530 G11
3531 G11
3532 H11
3533 H11
3534 I11
3535 I11
3536 I12
3566 M13
3567 L13
3568 H 4
3569 I 4
3570 L12
3571 F10
3572 G10
4510 E 4
4519 D 4
4531 E12
4533 D12
6520 E 9
6521 E10
6568 I 5
6569 I 5
7510 D 5
7510 G 5
7520 D11
7520 D 9
7535 F12
7566 M12
9504 C 3
9520 D 6
9522 D 4
9537 J12

Switch panel

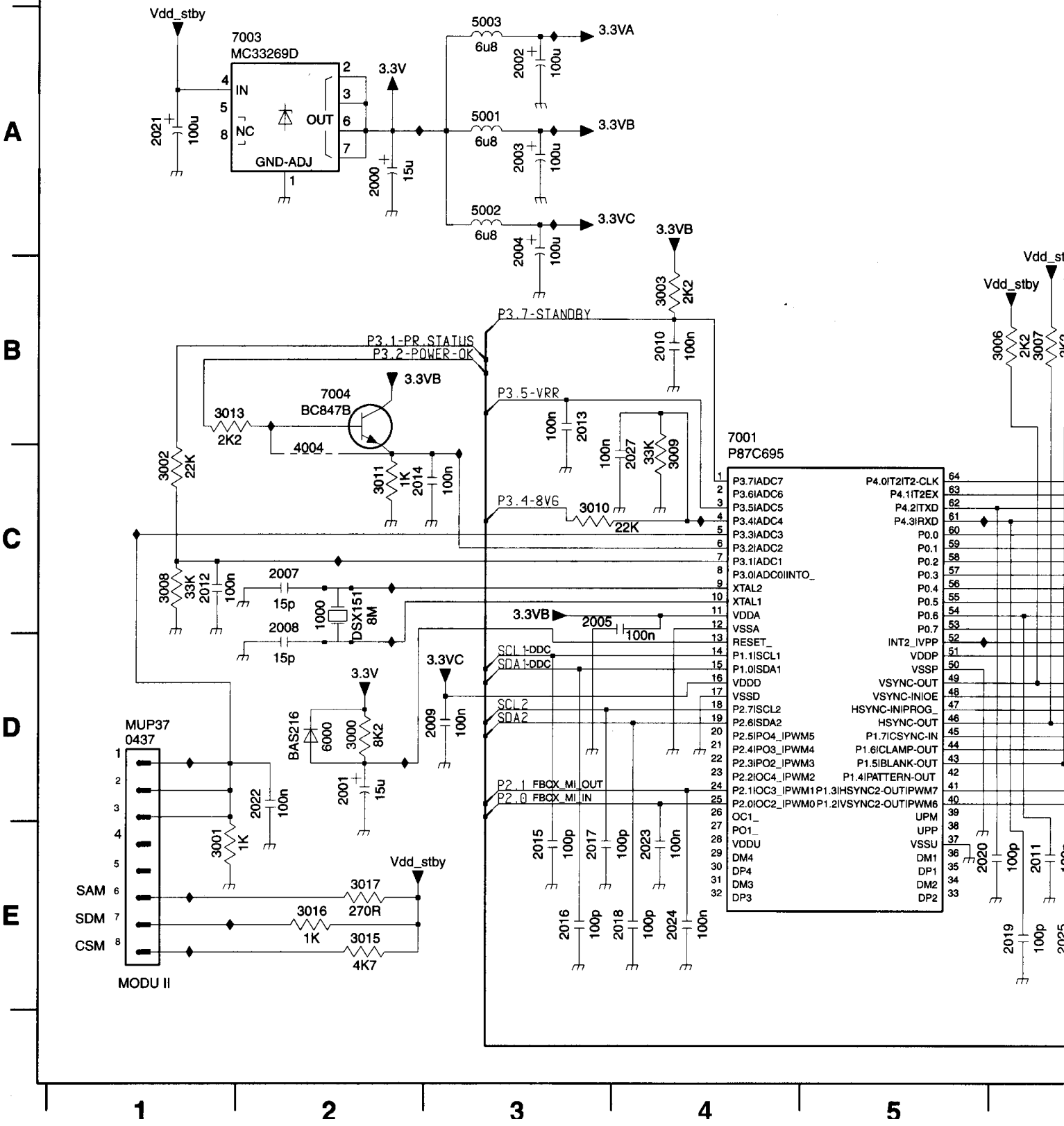


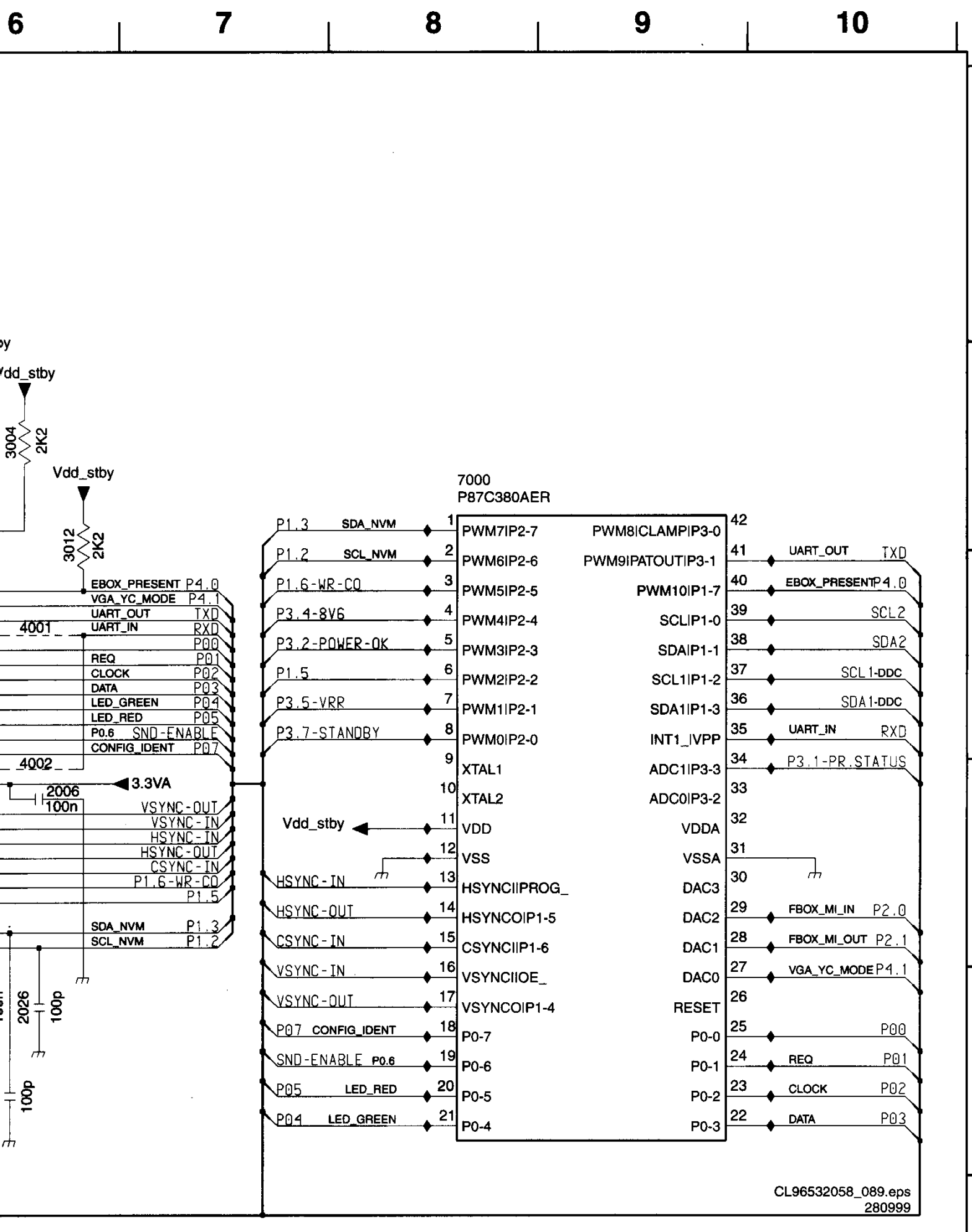
Switch panel (component side)



Monitor microprocessor panel

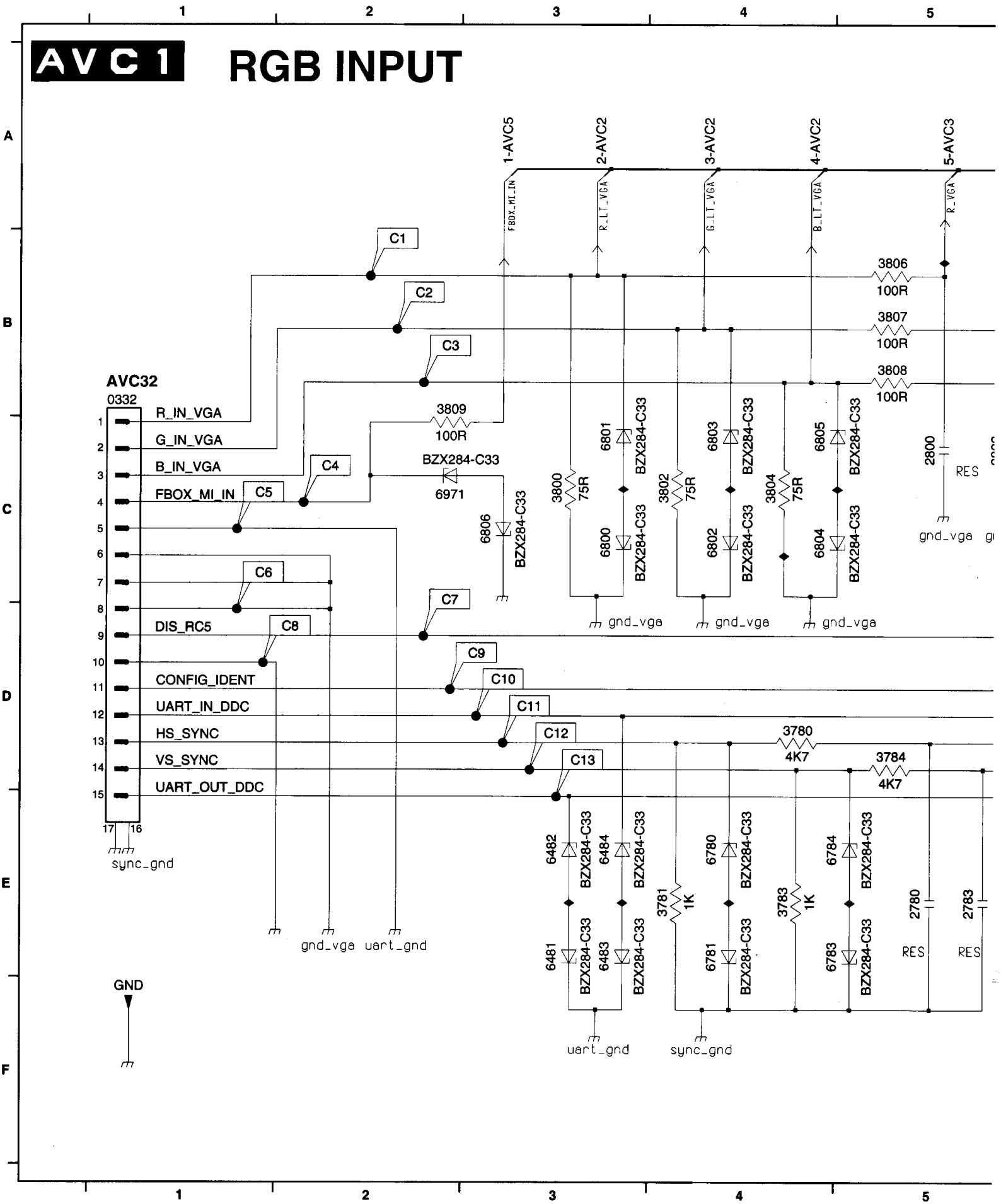
0437 D1	2003 A3	2008 C2	2013 B3	2018 E4	2023 E4	3000 D2	3006 B6	3011 C2	3017 E2	5002 A3	7003 A1
1000 C2	2004 A3	2009 D3	2014 C2	2019 E6	2024 E4	3001 D1	3007 B6	3012 B6	4001 C6	5003 A3	7004 B2
2000 A2	2005 C3	2010 B4	2015 E3	2020 E5	2025 E6	3002 C1	3008 C1	3013 B1	4002 D6	6000 D2	
2001 D2	2006 D6	2011 E6	2016 E3	2021 A1	2026 E6	3003 B4	3009 C4	3015 E2	4004 C2	7000 B8	
2002 A3	2007 C2	2012 C1	2017 E3	2022 D2	2027 C4	3004 B6	3010 C3	3016 E2	5001 A3	7001 B4	

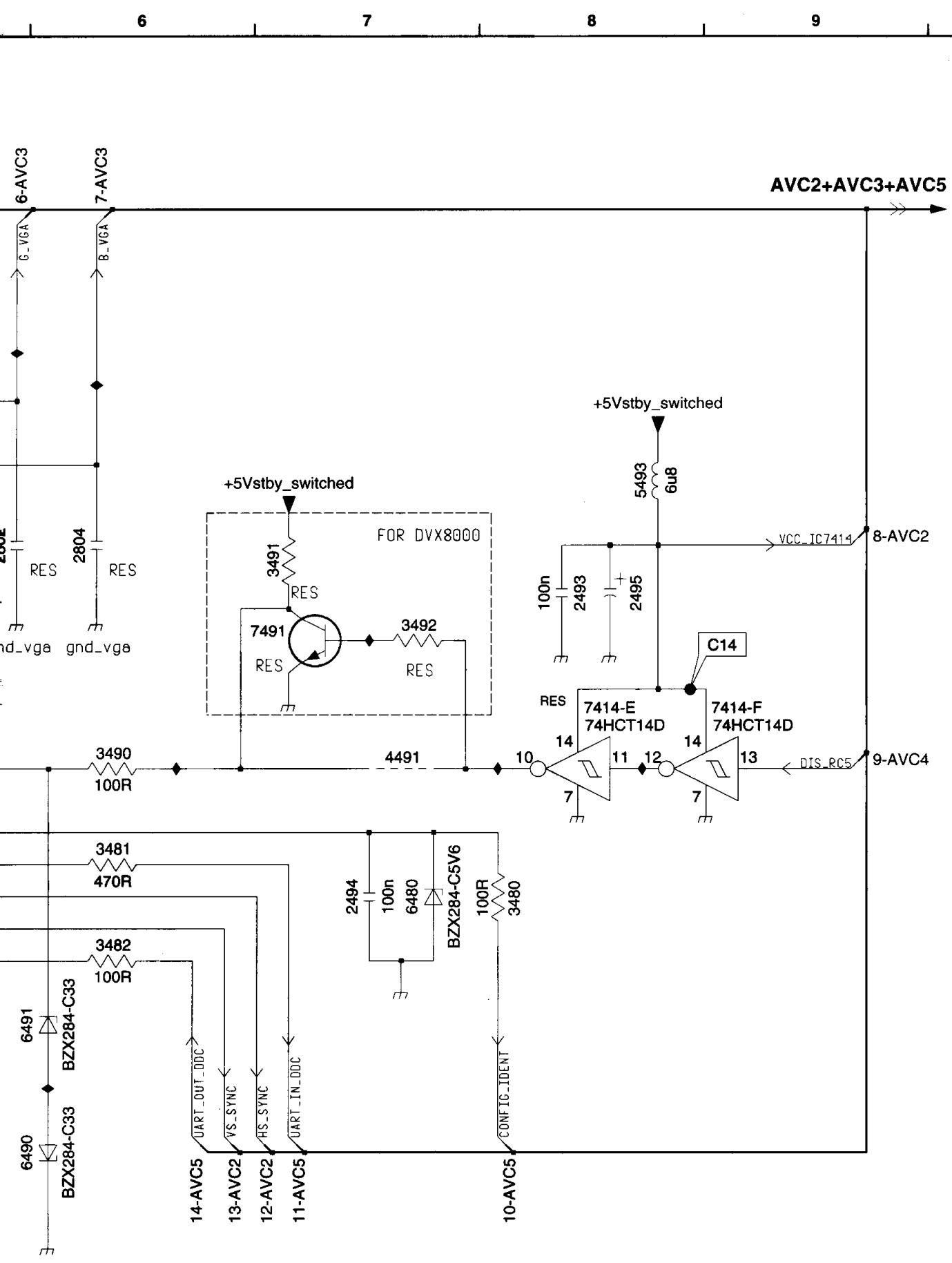



7000
P87C380AER
Vdd_stby
3004
2K2
3012
2K2
EBOX_PRESENT P4.0
VGA_YC_MODE P4.1
UART_OUT TXD
UART_IN RXD
P00
REQ P01
CLOCK P02
DATA P03
LED_GREEN P04
LED_RED P05
P0.6 SND-ENABLE
CONFIG_IDENT P07
4001
4002
3.3VA
2006
100n
VSYNC-OUT
VSYNC-IN
HSYNC-IN
HSYNC-OUT
CSYNC-IN
P1.6-WR-CO
P1.5
SDA_NVM P1.3
SCL_NVM P1.2
2026
100p
100p
P1.3 SDA_NVM
P1.2 SCL_NVM
P1.6-WR-CO
P3.4-8V6
P3.2-POWER-OK
P1.5
P3.5-VRR
P3.7-STANDBY
Vdd_stby
HSYNC-IN
HSYNC-OUT
CSYNC-IN
VSYNC-IN
VSYNC-OUT
P07 CONFIG_IDENT
SND-ENABLE P0.6
P05 LED_RED
P04 LED_GREEN
1 PWM7|P2-7
2 PWM6|P2-6
3 PWM5|P2-5
4 PWM4|P2-4
5 PWM3|P2-3
6 PWM2|P2-2
7 PWM1|P2-1
8 PWM0|P2-0
9 XTAL1
10 XTAL2
11 VDD
12 VSS
13 HSYNC|PROG_
14 HSYNCO|P1-5
15 CSYNC|P1-6
16 VSYNC|OE_
17 VSYNCO|P1-4
18 P0-7
19 P0-6
20 P0-5
21 P0-4
42 PWM8|CLAMP|P3-0
41 PWM9|PATOUT|P3-1
40 PWM10|P1-7
39 SCL|P1-0
38 SDA|P1-1
37 SCL1|P1-2
36 SDA1|P1-3
35 INT1_|VPP
34 ADC1|P3-3
33 ADC0|P3-2
32 VDDA
31 VSSA
30 DAC3
29 DAC2
28 DAC1
27 DAC0
26 RESET
25 P0-0
24 P0-1
23 P0-2
22 P0-3
UART_OUT TXD
EBOX_PRESENT P4.0
SCL2
SDA2
SCL1-DDC
SDA1-DDC
UART_IN RXD
P3.1-PR.STATUS
FBOX_MI_IN P2.0
FBOX_MI_OUT P2.1
VGA_YC_MODE P4.1
P00
REQ P01
CLOCK P02
DATA P03
CL96532058_089.eps
280999

AV control

AVC 1 RGB INPUT

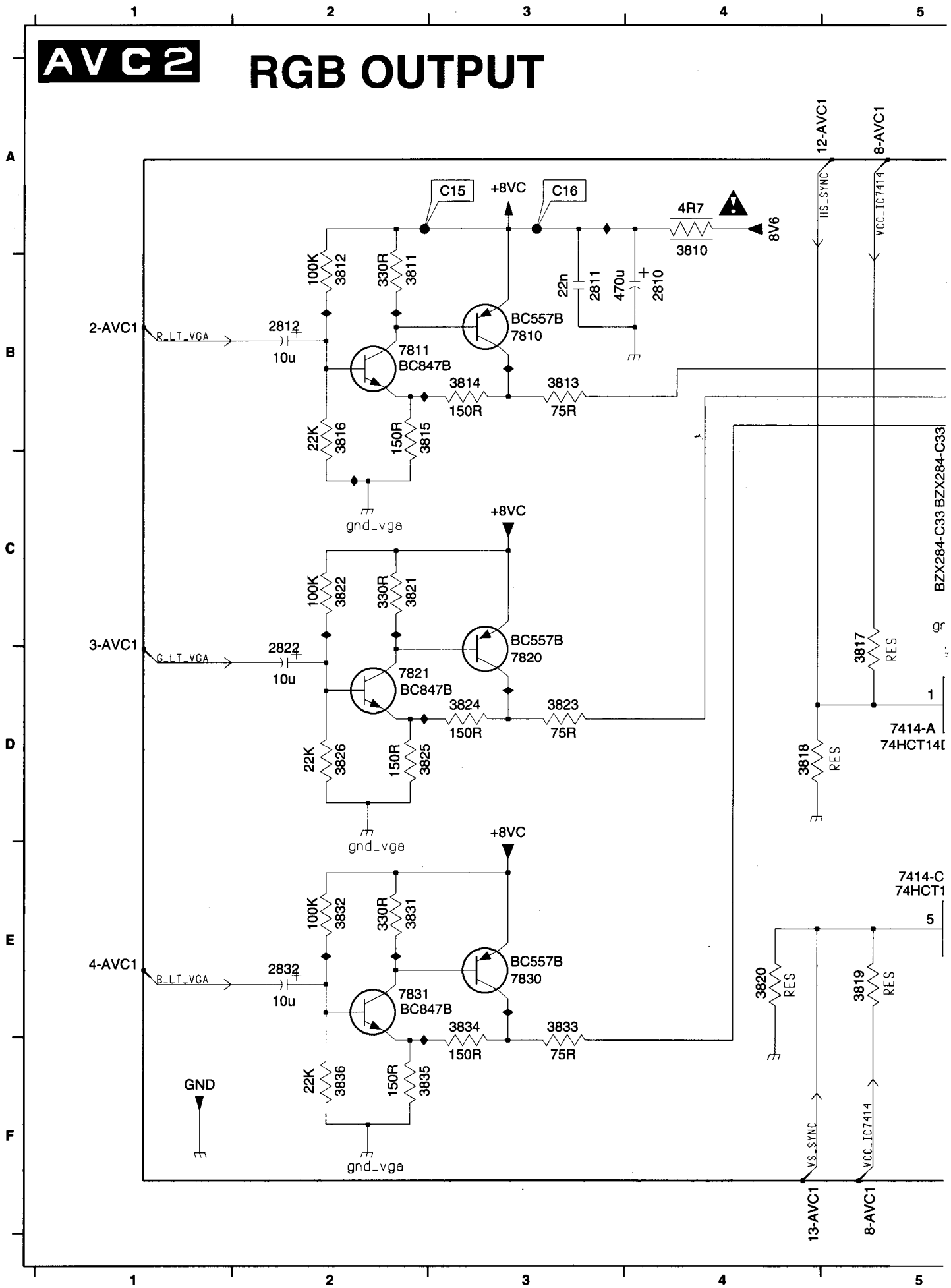


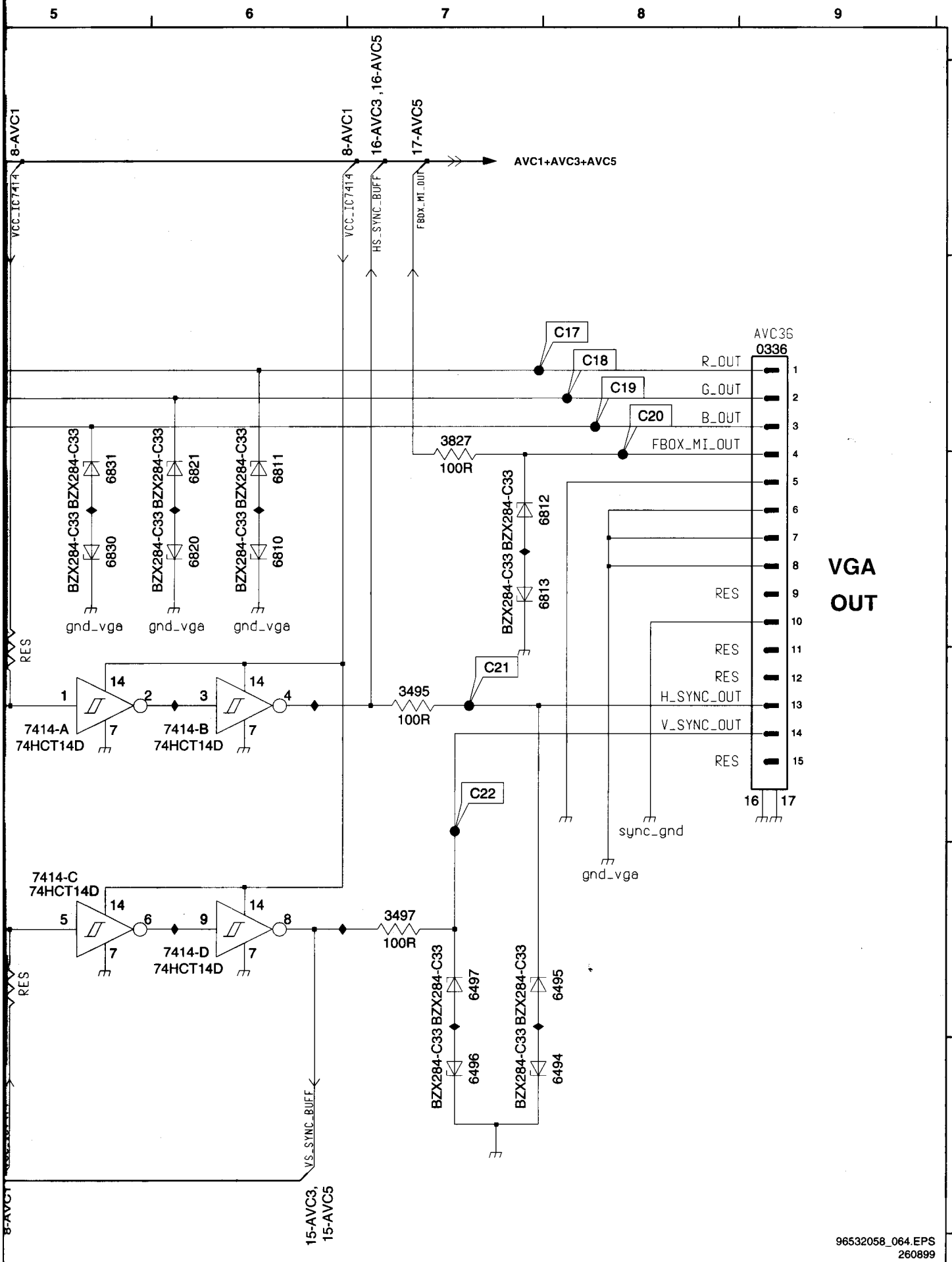


0332 B1
2493 C9
2494 D7
2495 C9
2780 E5
2783 E5
2800 C5
2802 C6
2804 C6
3480 D8
3481 D6
3482 E6
3490 D6
3491 C7
3492 C8
3780 D4
3781 E4
3783 E4
3784 E5
3800 C3
3802 C4
3804 C4
3806 B5
3807 B5
3808 B5
3809 B2
4491 D7
5493 C8
6480 D8
6481 E3
6482 E3
6483 E3
6484 E3
6490 E6
6491 E6
6780 E4
6781 E4
6783 E5
6784 E5
6800 C3
6801 C3
6802 C4
6803 C4
6804 C5
6805 C5
6806 C3
6971 C2
7414-E D8
7414-F D9
7491 C7

96532058_063.EPS
260899

AV control

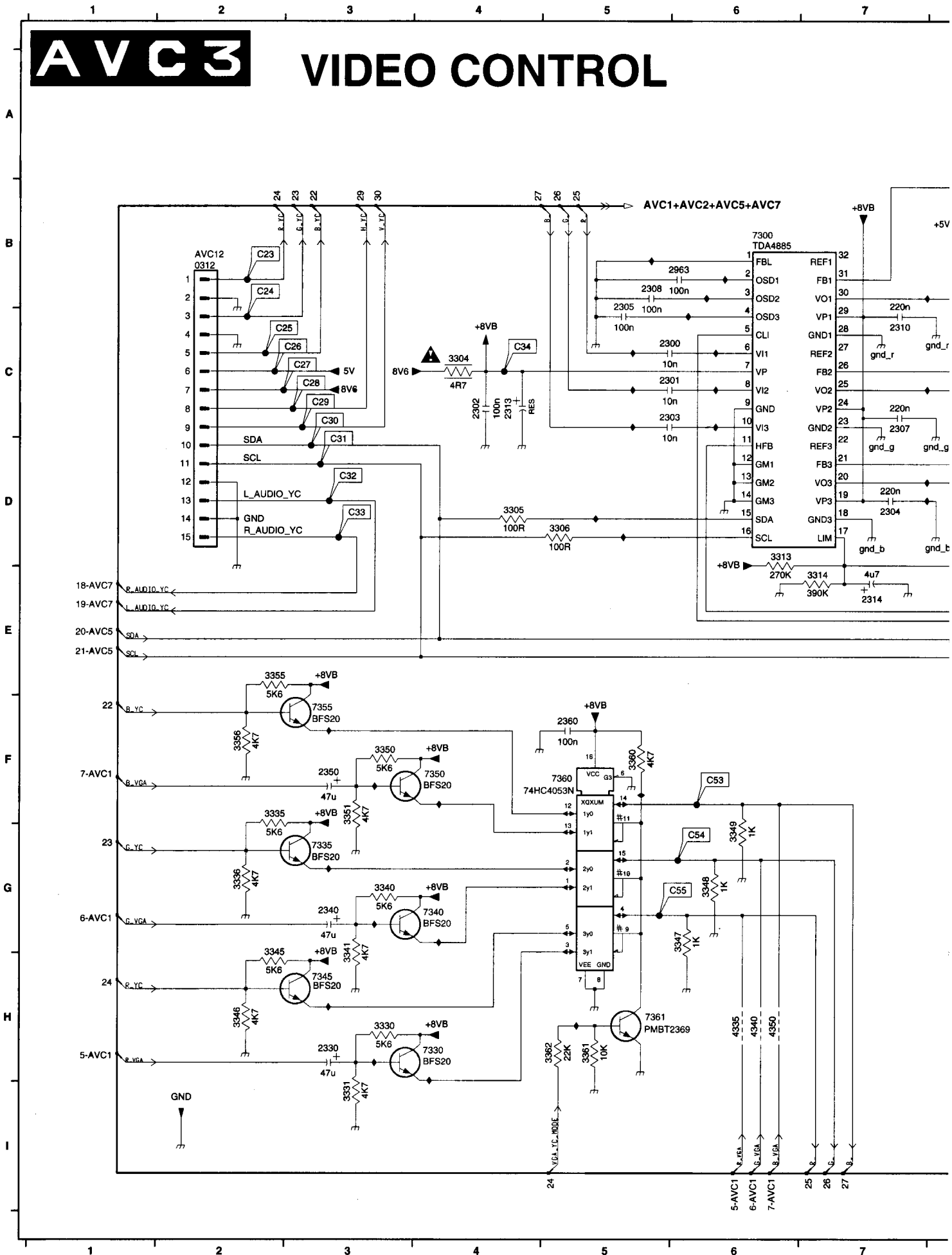

AVC2
RGB OUTPUT
12-AVC1
8-AVC1
HS_SYNC
VCC_IC7414
C15
+8VC
C16
4R7
3810
8V6
100K
3812
330R
3811
22n
2811
470u
2810
2-AVC1
R_LT_VGA
2812
10u
BC557B
7810
7811
BC847B
3814
150R
3813
75R
22K
3816
150R
3815
gnd_vga
+8VC
100K
3822
330R
3821
3-AVC1
G_LT_VGA
2822
10u
BC557B
7820
7821
BC847B
3824
150R
3823
75R
22K
3826
150R
3825
gnd_vga
+8VC
100K
3832
330R
3831
4-AVC1
B_LT_VGA
2832
10u
BC557B
7830
7831
BC847B
3834
150R
3833
75R
22K
3836
150R
3835
GND
gnd_vga
BZX284-C33 BZX284-C33
3817
RES
3818
RES
7414-A
74HCT14
7414-C
74HCT1
3820
RES
3819
RES
VS_SYNC
VCC_IC7414
13-AVC1
8-AVC1

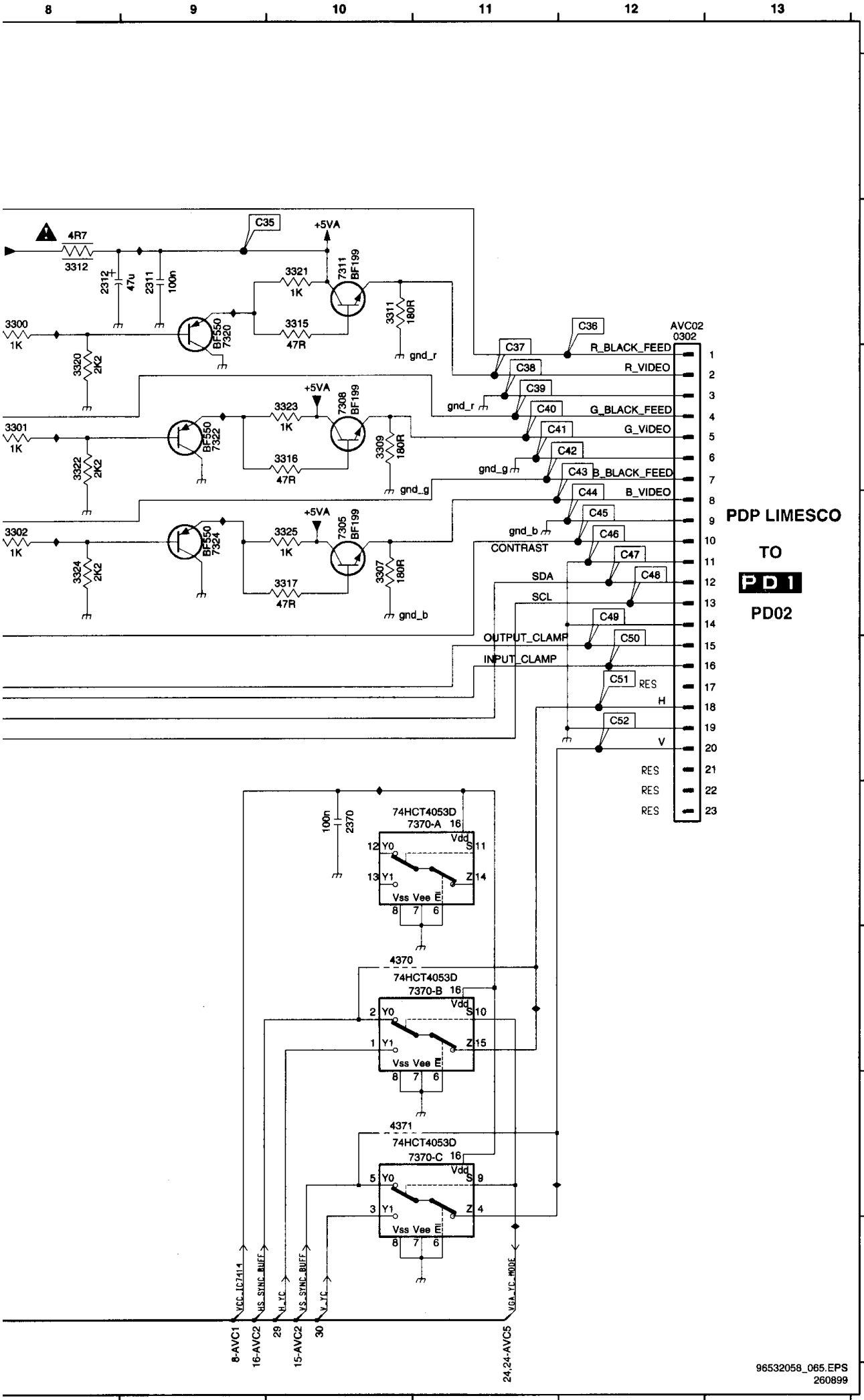


0336 B8
2810 A6
2811 A6
2812 B4
2822 C2
2832 E2
3495 D7
A 3497 E7
3810 A5
3811 A5
3812 A4
3813 B6
3814 B5
3815 B5
3816 B4
3817 D5
B 3818 D5
3819 E5
3820 E5
3821 B3
3822 B3
3823 C4
3824 C3
3825 C3
3826 C3
C 3827 B7
3831 D2
3832 D2
3833 E3
3834 E3
3835 E3
3836 E2
6494 F7
6495 E7
6496 F7
D 6497 E7
6810 C6
6811 C6
6812 C7
6813 C7
6820 C6
6821 C6
6830 C6
6831 C6
E 7414-A D5
7414-B D6
7414-C E5
7414-D E6
7810 B5
7811 B5
7820 C4
7821 C3
7830 E3
F 7831 E2

AV control

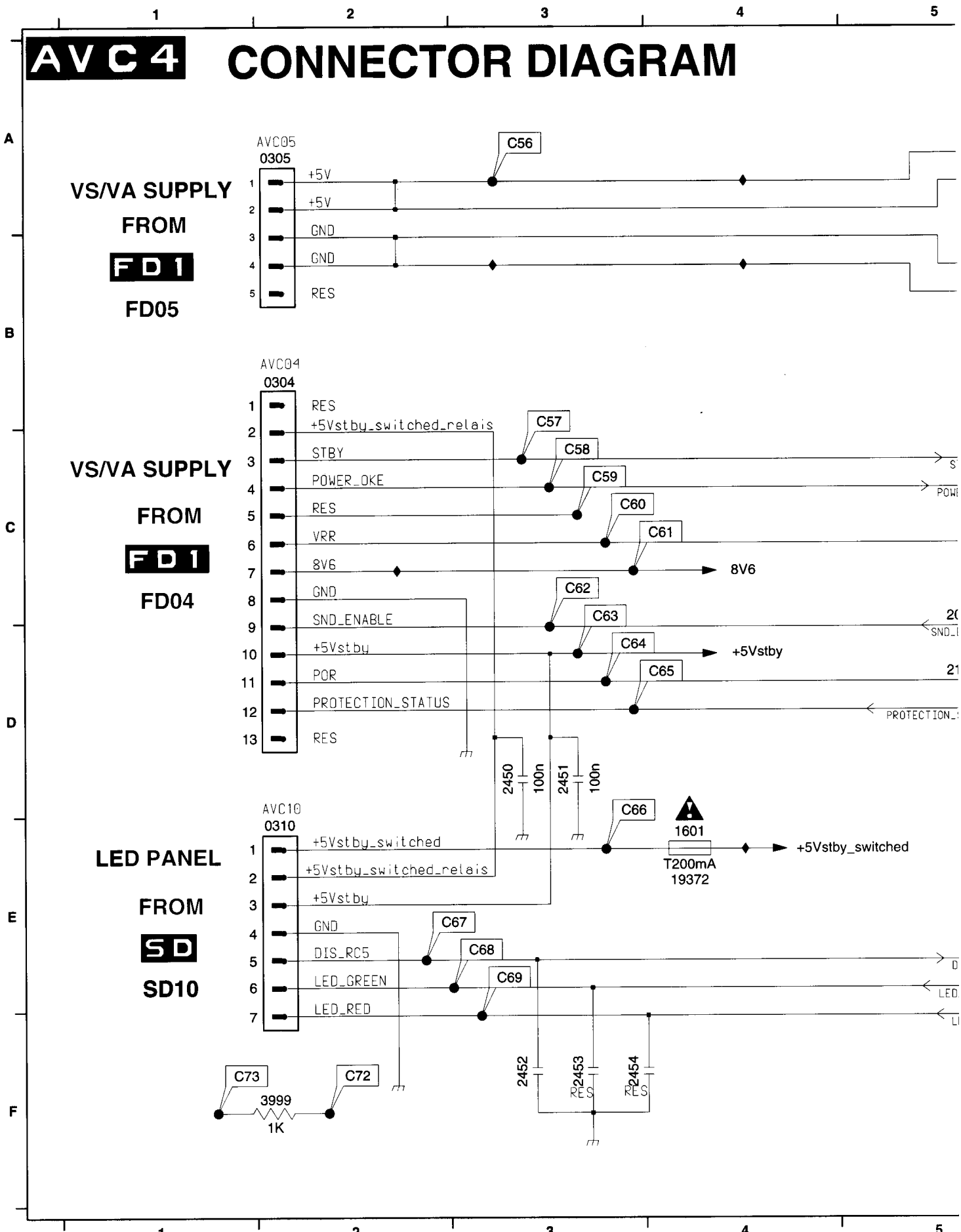
AVC3 VIDEO CONTROL

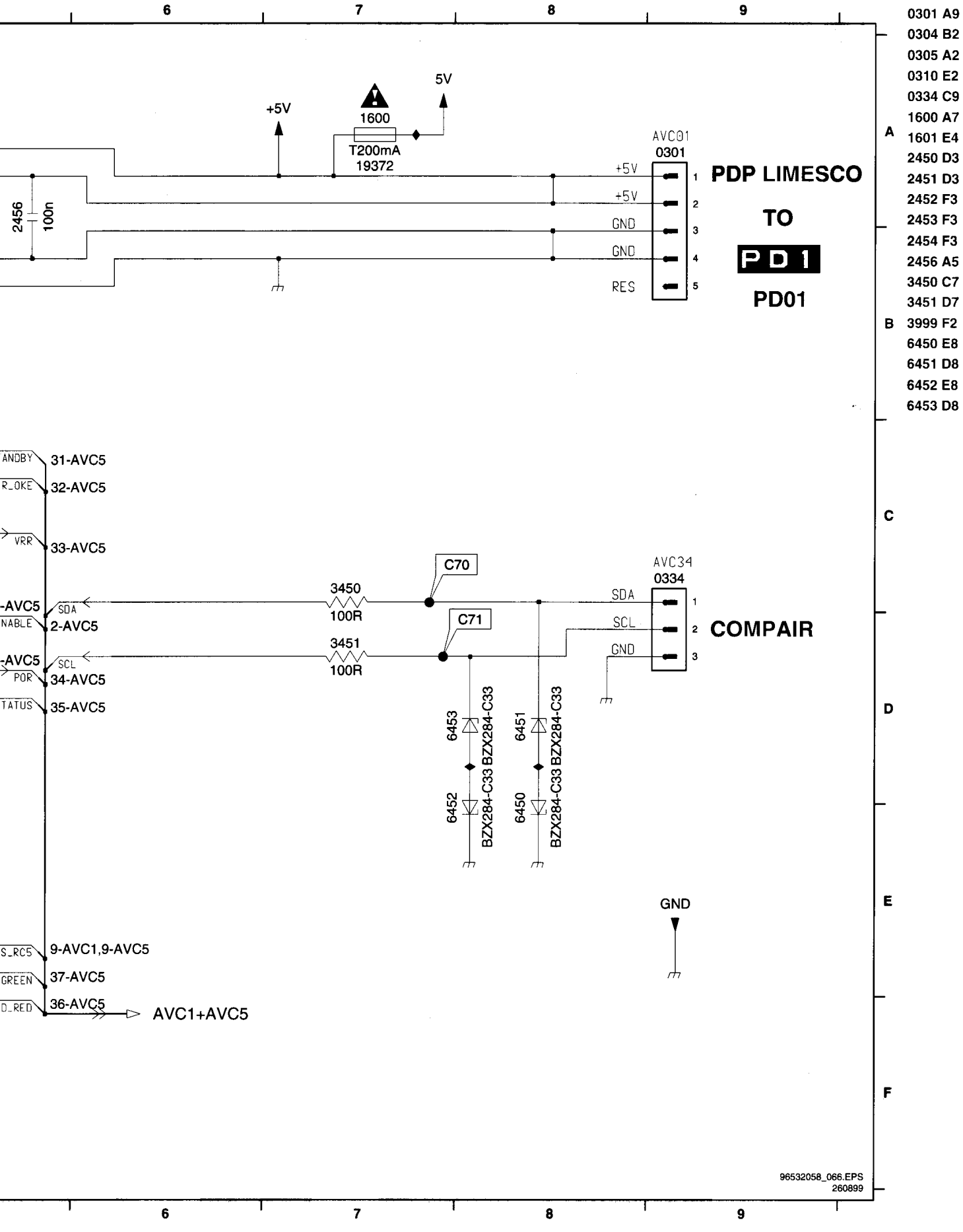




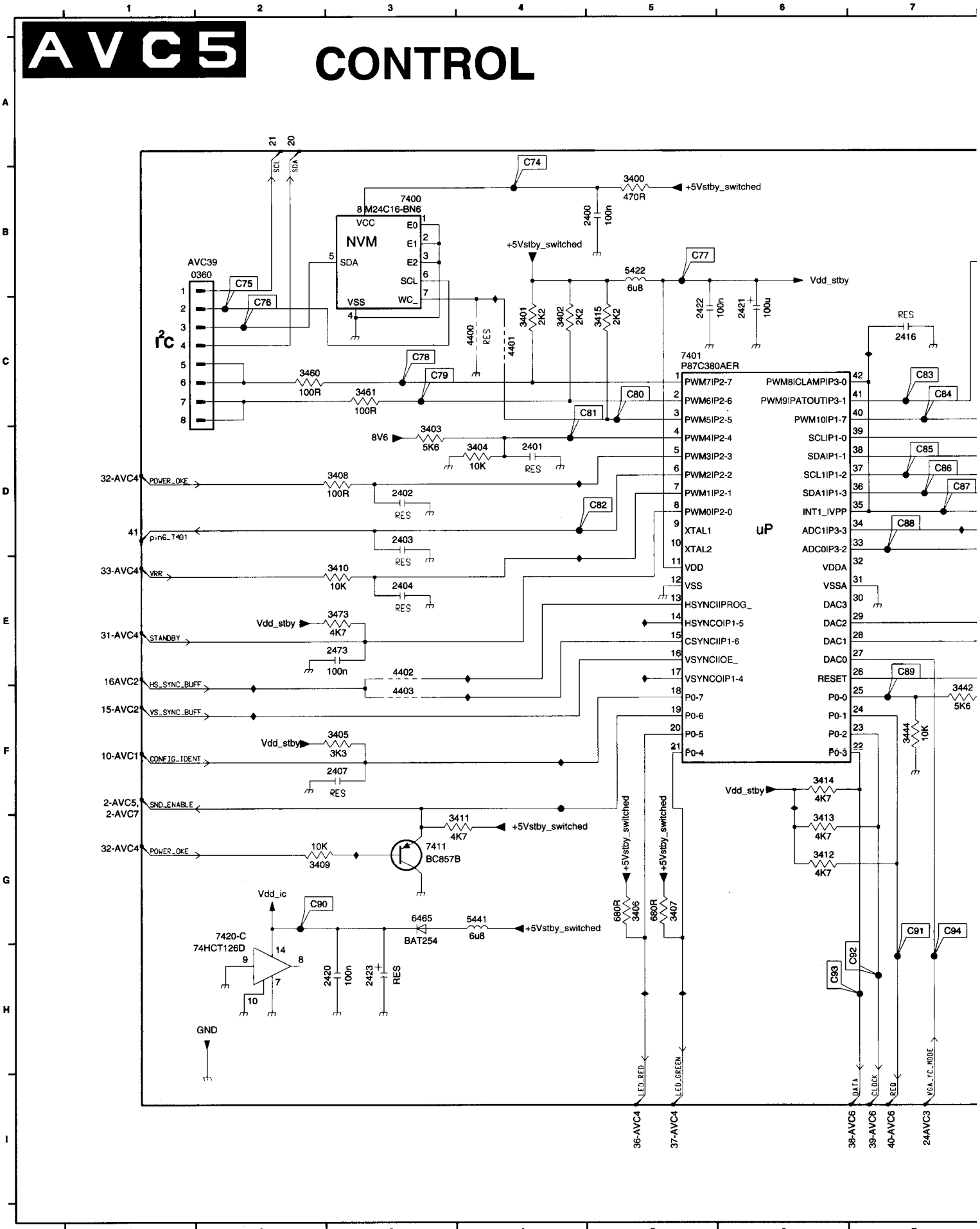
0302 B12
0312 B2
2300 B5
2301 C5
2302 C4
2303 C5
A 2304 E7
2305 B5
2307 D8
2308 B5
2310 B8
2311 A10
2312 A10
2313 C5
B 2314 D7
2330 H3
2340 F3
2350 E3
2360 E5
2370 G10
2963 B5
C 3300 B8
3301 C7
3302 E8
3304 B4
3305 D5
3306 D5
3307 E10
3309 D10
D 3311 B10
3312 A11
3313 D6
3314 D7
3315 B9
3316 C9
3317 D9
3320 B8
E 3321 A9
3322 D8
3323 C9
3324 E8
3325 D9
3330 G4
3331 H4
3335 G3
F 3336 G3
3340 F4
3341 G4
3345 H3
3346 H3
3347 G6
3348 F6
3349 F6
G 3350 E4
3351 E4
3355 E3
3356 F3
3360 F6
3361 I5
3362 H5
H 4335 E6
4340 E6
4350 E6
4370 G9
4371 I9
7300 B6
7305 D10
7308 C10
I 7311 B10
7320 B8
7322 C8
7324 D8
7330 H4
7335 G3
7340 F4
7345 H3
7350 E4
7355 E3
7360 F6
7361 H6
7370-A G11
7370-B G9
7370-C H9

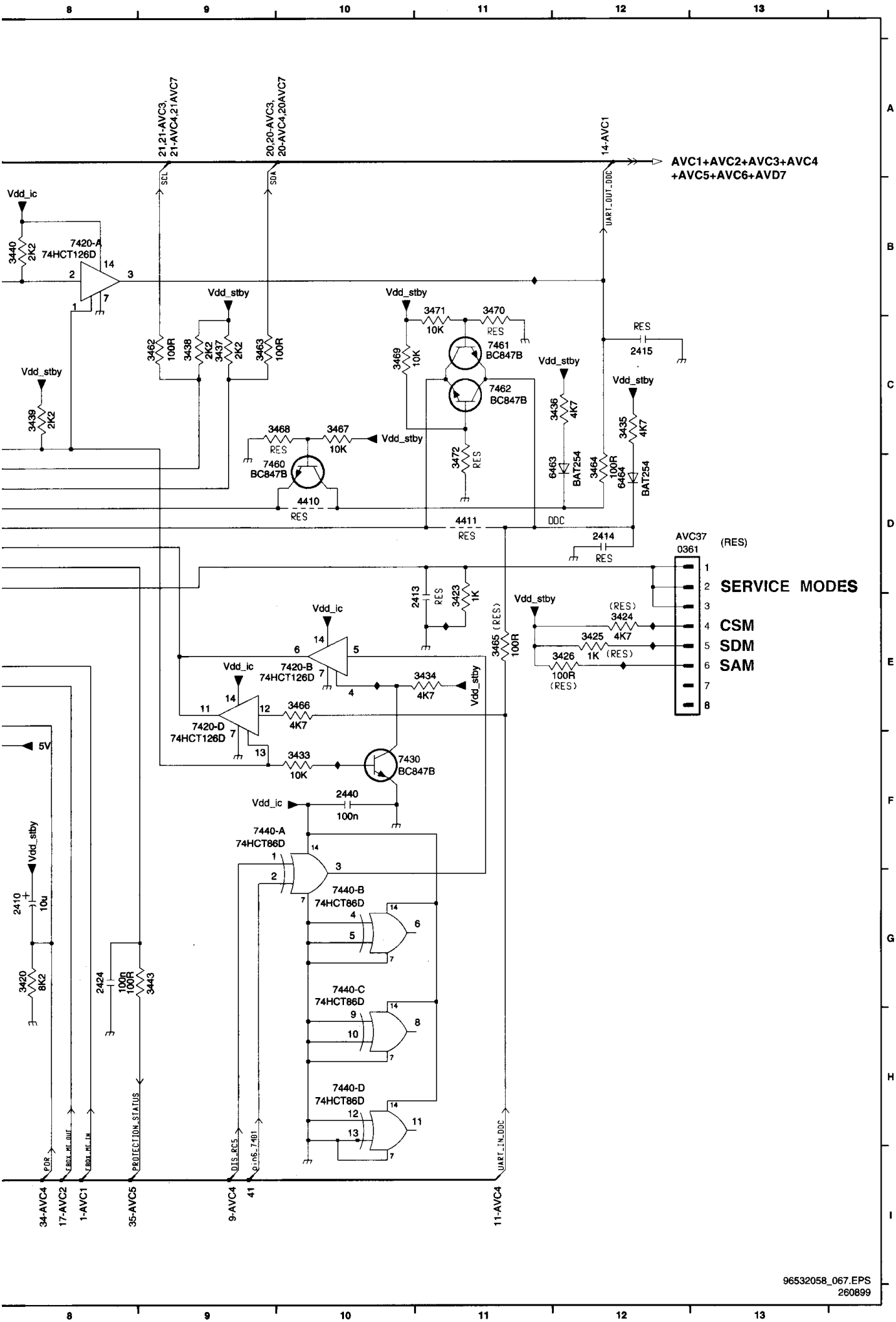
AV control


AVC4 CONNECTOR DIAGRAM
VS/VA SUPPLY FROM FD1 FD05
AVC05
0305
+5V
+5V
GND
GND
RES
C56
VS/VA SUPPLY FROM FD1 FD04
AVC04
0304
RES
+5Vstby_switched_relais
STBY
POWER_OKE
RES
VRR
8V6
GND
SND_ENABLE
+5Vstby
POR
PROTECTION_STATUS
RES
C57
C58
C59
C60
C61
C62
C63
C64
C65
8V6
+5Vstby
LED PANEL FROM SD SD10
AVC10
0310
+5Vstby_switched
+5Vstby_switched_relais
+5Vstby
GND
DIS_RC5
LED_GREEN
LED_RED
C66
C67
C68
C69
1601
T200mA
19372
+5Vstby_switched
2450
100n
2451
100n
2452
2453
2454
C73
3999
1K
C72


6
7
8
9
0301 A9
0304 B2
0305 A2
0310 E2
0334 C9
1600 A7
1601 E4
2450 D3
2451 D3
2452 F3
2453 F3
2454 F3
2456 A5
3450 C7
3451 D7
3999 F2
6450 E8
6451 D8
6452 E8
6453 D8
A
B
C
D
E
F
+5V
5V
1600
T200mA
19372
2456
100n
AVC01
0301
+5V
+5V
GND
GND
RES
1
2
3
4
5
PDP LIMESCO
TO
PD 1
PD01
ANDBY
31-AVC5
R_OKE
32-AVC5
VRR
33-AVC5
-AVC5
SDA
NABLE
2-AVC5
-AVC5
SCL
POR
34-AVC5
TATUS
35-AVC5
C70
C71
3450
100R
3451
100R
AVC34
0334
SDA
SCL
GND
1
2
3
COMPAIR
6453
6452
6451
6450
BZX284-C33
BZX284-C33
BZX284-C33
BZX284-C33
GND
S_RC5
9-AVC1,9-AVC5
GREEN
37-AVC5
D_RED
36-AVC5
AVC1+AVC5
96532058_066.EPS
260899

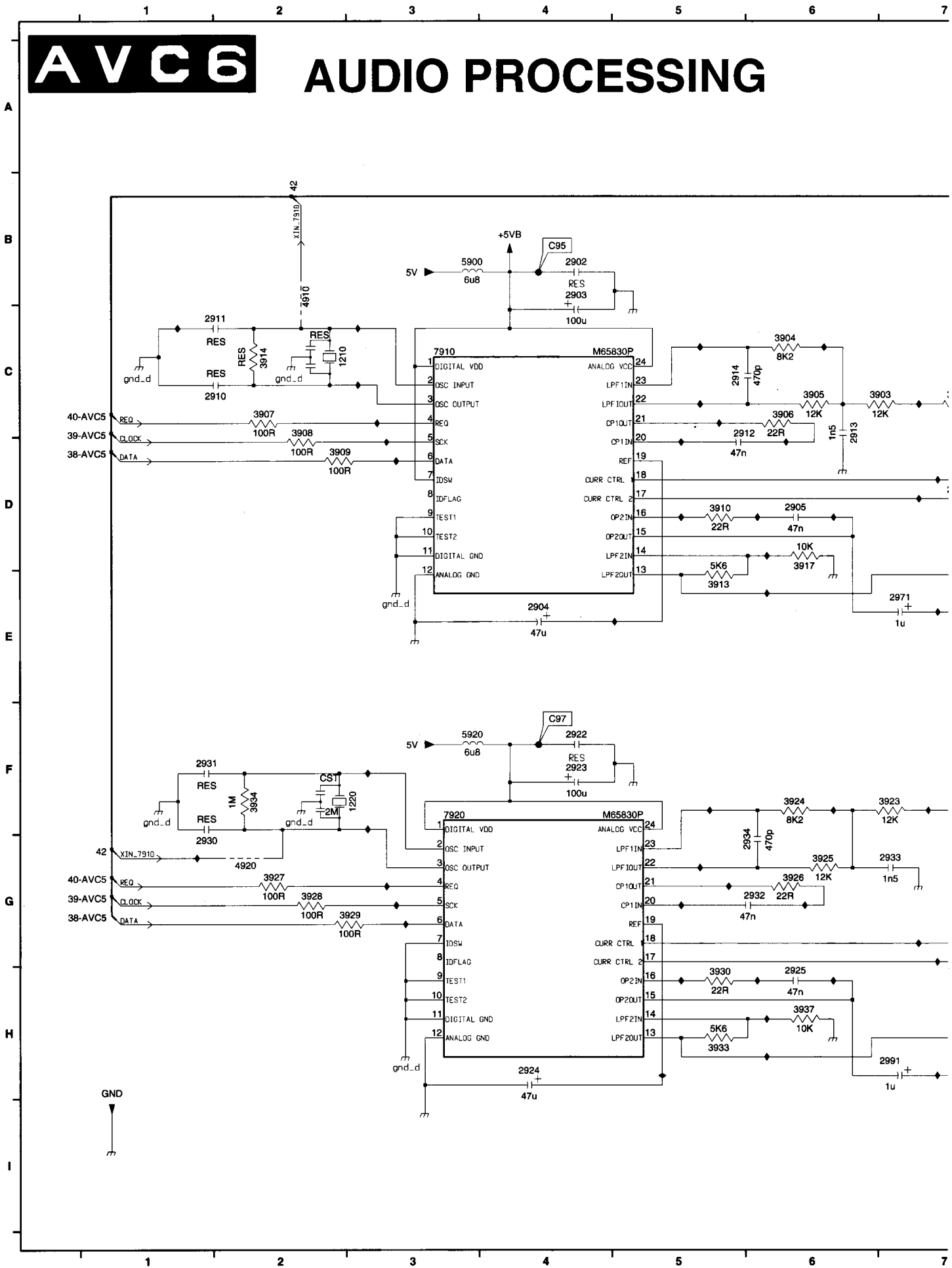
AV control

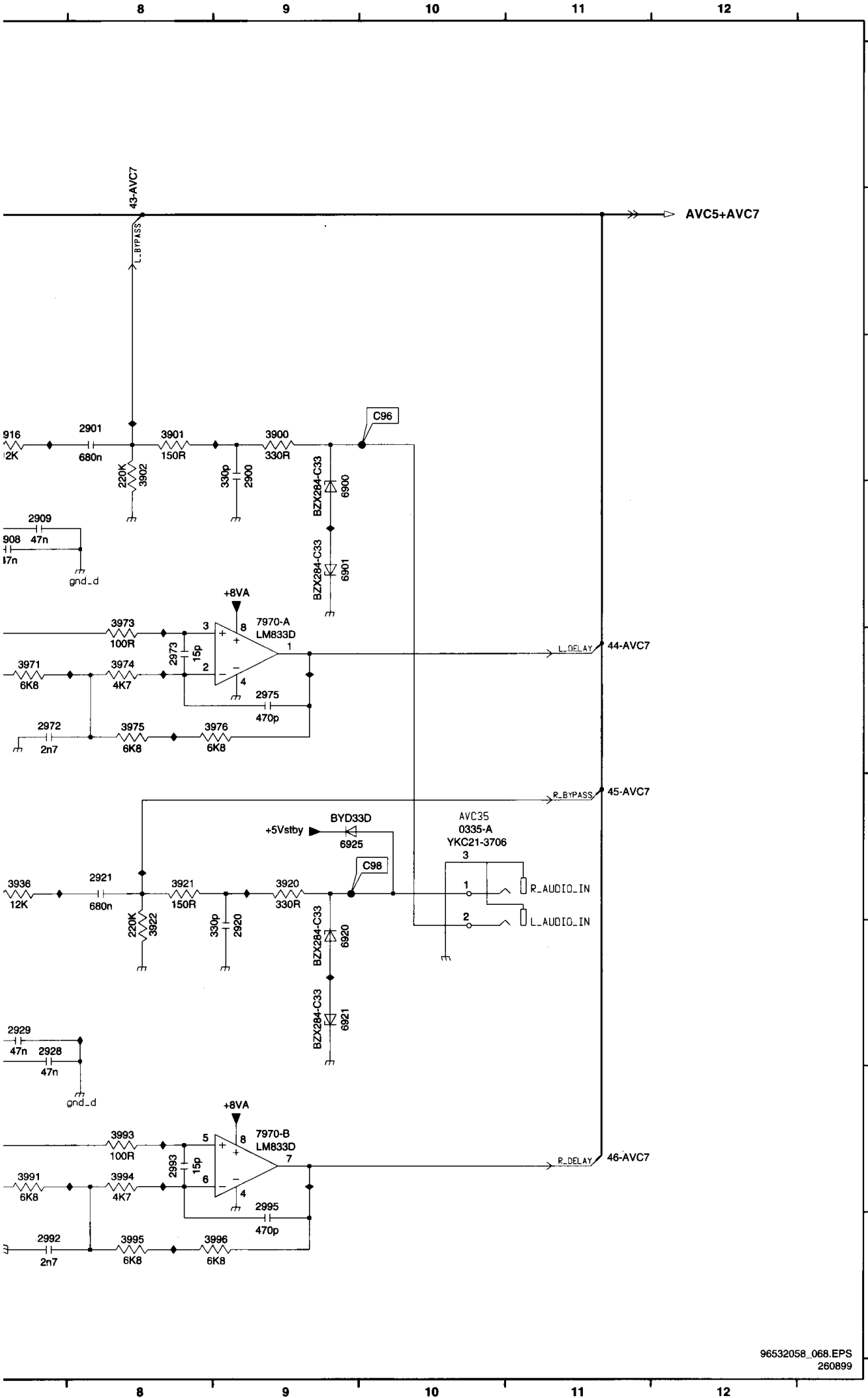

AVC5
CONTROL
I²C
NVM
M24C16-BN6
P87C380AER
uP
AVC39
0360
7400
7401
7411
BC857B
7420-C
74HCT126D
BAT254
Vdd_stby
+5Vstby_switched
Vdd_ic
GND
SCL
SDA
POWER_OKE
pin6_7401
VRR
STANDBY
HS_SYNC_BUFF
VS_SYNC_BUFF
CONFIG_IDENT
SND_ENABLE
LED_RED
LED_GREEN
DATA
CLOCK
RED
VGA_YC_MODE



0360 B2	7440-C G10
0361 D12	7440-D H10
2400 B5	7460 D9
2401 D4	7461 C11
2402 D3	7462 C11
2403 D3	
2404 E3	
A 2407 F3	
2410 G8	
2413 E11	
2414 D12	
2415 C12	
2416 C7	
2420 H3	
2421 C6	
2422 C5	
B 2423 H3	
2424 G8	
2440 F10	
2473 E3	
3400 B5	
3401 C4	
3402 C4	
3403 D3	
3404 D4	
C 3405 F3	
3406 G5	
3407 G5	
3408 D3	
3409 G2	
3410 E3	
3411 G4	
3412 F6	
3413 G6	
D 3414 G6	
3415 C5	
3420 G8	
3423 E11	
3424 E12	
3425 E12	
3426 E12	
3433 F10	
3434 E11	
3435 C12	
E 3436 C12	
3437 C9	
3438 C9	
3439 C8	
3440 B8	
3442 F7	
3443 G9	
3444 F7	
3460 C2	
F 3461 C3	
3462 C9	
3463 C9	
3464 D12	
3465 E11	
3466 E10	
3467 C10	
3468 C10	
3469 C10	
G 3470 B11	
3471 B11	
3472 D11	
3473 E3	
4400 C4	
4401 C4	
4402 E3	
4403 F3	
4410 D10	
4411 D11	
H 5422 B5	
5441 G4	
6463 D12	
6464 D12	
6465 G3	
7400 B3	
7401 C5	
7411 G3	
7420-A B8	
I 7420-B E10	
7420-C G2	
7420-D E9	
7430 F10	
7440-A F9	
7440-B G10	

AV control

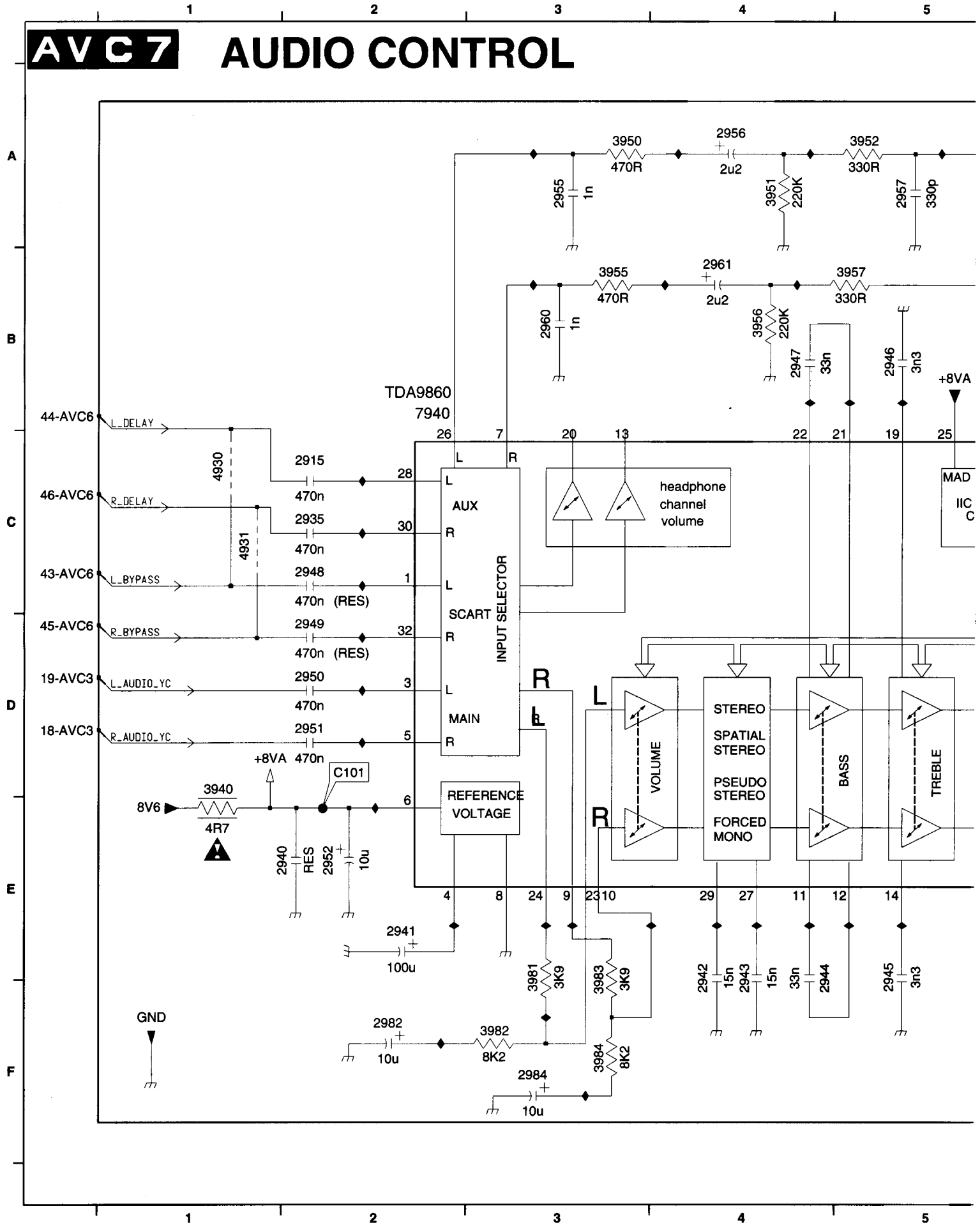

AVC6
AUDIO PROCESSING
+5VB
5V
C95
5900
6u8
2902
RES
2903
100u
7910
M65830P
DIGITAL VDD
OSC INPUT
OSC OUTPUT
REQ
SCK
DATA
IDSW
IDFLAG
TEST1
TEST2
DIGITAL GND
ANALOG GND
ANALOG VCC
LPF1IN
LPF1OUT
OP1OUT
OP1IN
REF
CURR CTRL
CURR CTRL 2
OP2IN
OP2OUT
LPF2IN
LPF2OUT
2911
2910
3914
1210
4910
XIN_7910
42
40-AVC5
39-AVC5
38-AVC5
3907
3908
3909
100R
3904
8K2
3905
12K
3903
12K
3906
22R
2912
47n
2914
470p
1n5
2913
3910
22R
2905
47n
3917
10K
3913
5K6
2904
47u
2971
1u
C97
5920
6u8
2922
2923
2931
2930
3934
1M
CS1
2M
1220
4920
3927
3928
3929
3924
3923
3925
2933
1n5
3926
2932
2934
3930
2925
3937
2924
2991
GND

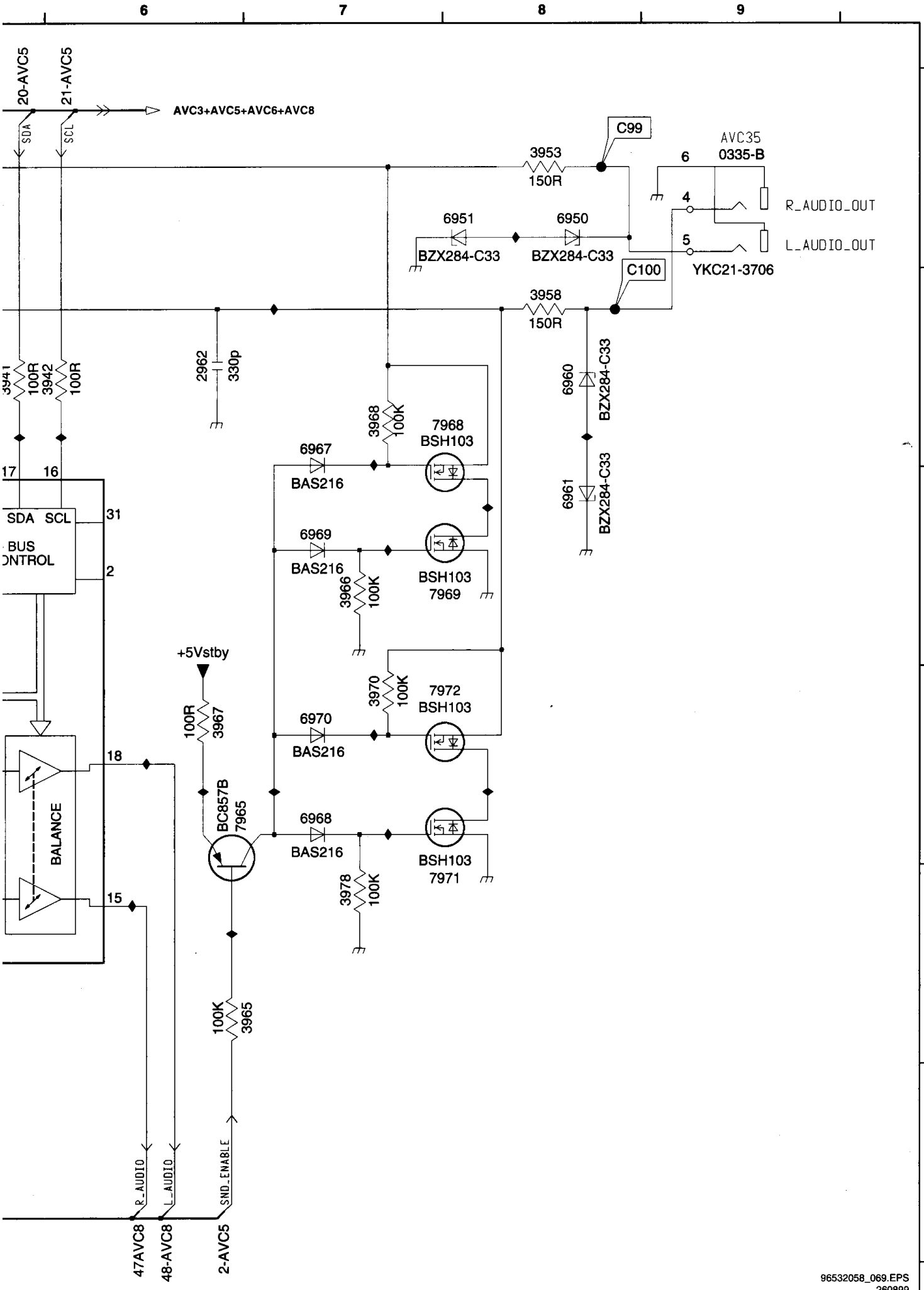


	0335-A E12	3993 G11
	1210 B2	3994 H11
	1220 F2	3995 H11
	2900 A8	3996 H11
	2901 A8	4910 B1
A	2902 A4	4920 G3
	2903 A4	5900 A3
	2904 C4	5920 E4
	2905 B6	6900 A9
	2908 B7	6901 B9
	2909 B7	6920 F9
	2910 C3	6921 F9
	2911 C1	6925 E11
B	2912 B6	7910 A4
	2913 B6	7920 F4
	2914 A6	7970-A C11
	2920 F8	7970-B G11
	2921 E8	
	2922 E5	
	2923 E4	
	2924 G4	
C	2925 G6	
	2928 G7	
	2929 F7	
	2930 G3	
	2931 G1	
	2932 F6	
	2933 F7	
	2934 F6	
D	2971 C10	
	2972 D10	
	2973 C11	
	2975 D11	
	2991 H10	
	2992 I10	
	2993 H11	
	2995 H11	
E	3900 A8	
	3901 A8	
	3902 A8	
	3903 A7	
	3904 A6	
	3905 B6	
	3906 B6	
F	3907 B3	
	3908 B3	
	3909 B3	
	3910 B6	
	3913 C6	
	3914 C2	
	3916 A7	
	3917 C6	
G	3920 E8	
	3921 E8	
	3922 F8	
	3923 E7	
	3924 E6	
	3925 F6	
	3926 F6	
	3927 F3	
H	3928 F3	
	3929 F3	
	3930 G6	
	3933 G6	
	3934 G2	
	3936 E7	
	3937 G6	
	3971 C10	
I	3973 C11	
	3974 C11	
	3975 D11	
	3976 D11	
	3991 H10	

96532058_068.EPS
260899

AV control

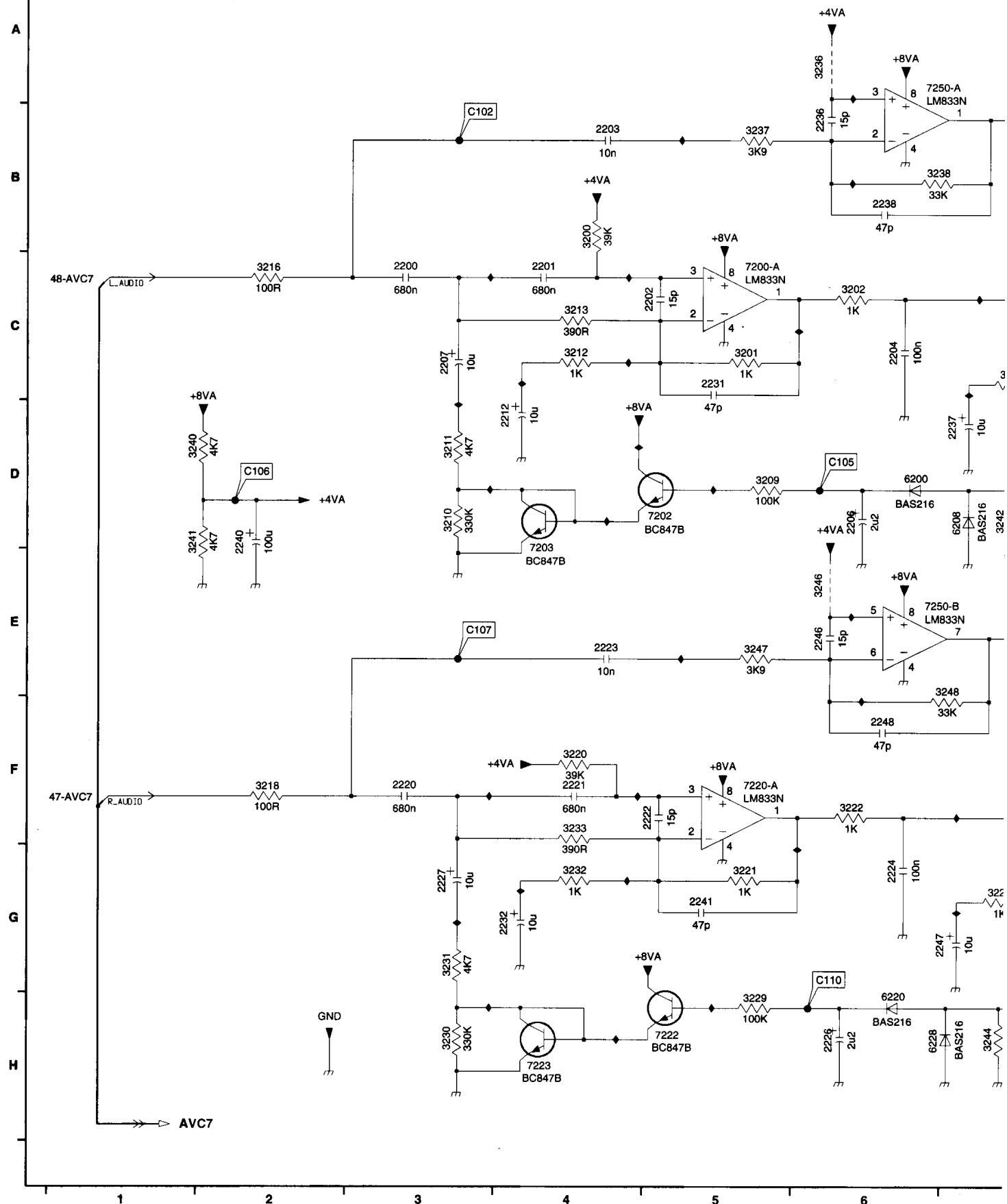

AVC7
AUDIO CONTROL
TDA9860
7940
44-AVC6
L_DELAY
46-AVC6
R_DELAY
43-AVC6
L_BYPASS
45-AVC6
R_BYPASS
19-AVC3
L_AUDIO_YC
18-AVC3
R_AUDIO_YC
2915 470n
2935 470n
2948 470n (RES)
2949 470n (RES)
2950 470n
2951 470n
4930
4931
AUX
SCART
MAIN
INPUT SELECTOR
REFERENCE VOLTAGE
headphone channel volume
VOLUME
STEREO
SPATIAL STEREO
PSEUDO STEREO
FORCED MONO
BASS
TREBLE
3950 470R
2956 2u2
3952 330R
2955 1n
3951 220K
2957 330p
3955 470R
2961 2u2
3957 330R
2960 1n
3956 220K
2947 33n
2946 3n3
+8VA
MAD
IIC
C
3940 4R7
8V6
C101
2940 RES
2952 10u
2941 100u
3981 3K9
3983 3K9
2982 10u
3982 8K2
3984 8K2
2984 10u
2942 15n
2943 15n
33n 2944
2945 3n3
GND

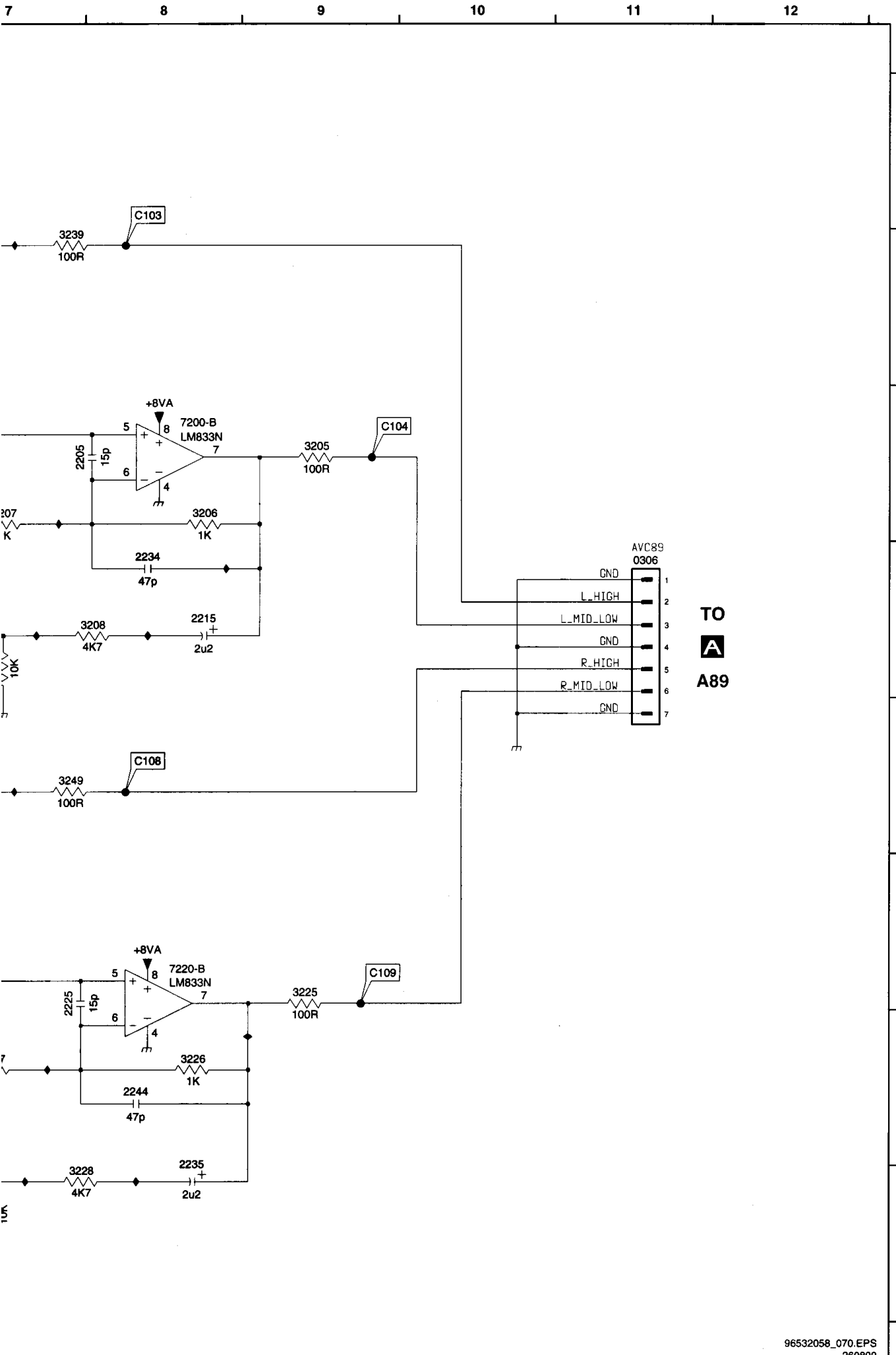


0335-B A9
2915 C2
2935 C2
2940 E2
2941 E2
2942 E4
2943 E4
2944 E4
2945 E5
2946 B5
2947 B4
2948 C2
2949 D2
2950 D2
2951 D2
2952 E2
2955 A3
2956 A4
2957 A5
2960 B3
2961 B4
2962 B8
2982 F2
2984 F3
3940 D1
3941 B5
3942 B6
3950 A3
3951 A4
3952 A5
3953 A7
3955 B3
3956 B4
3957 B5
3958 B8
3965 B6
3966 C7
3967 B6
3968 B7
3970 D7
3978 E7
3981 E3
3982 F3
3983 E3
3984 F3
4930 C1
4931 C1
6950 A8
6951 A8
6960 B8
6961 C8
6967 B7
6968 D7
6969 C7
6970 D7
7940 B2
7965 C6
7968 C7
7969 C7
7971 D7
7972 D7

AV control

AVC8 AUDIO FILTER + DBE



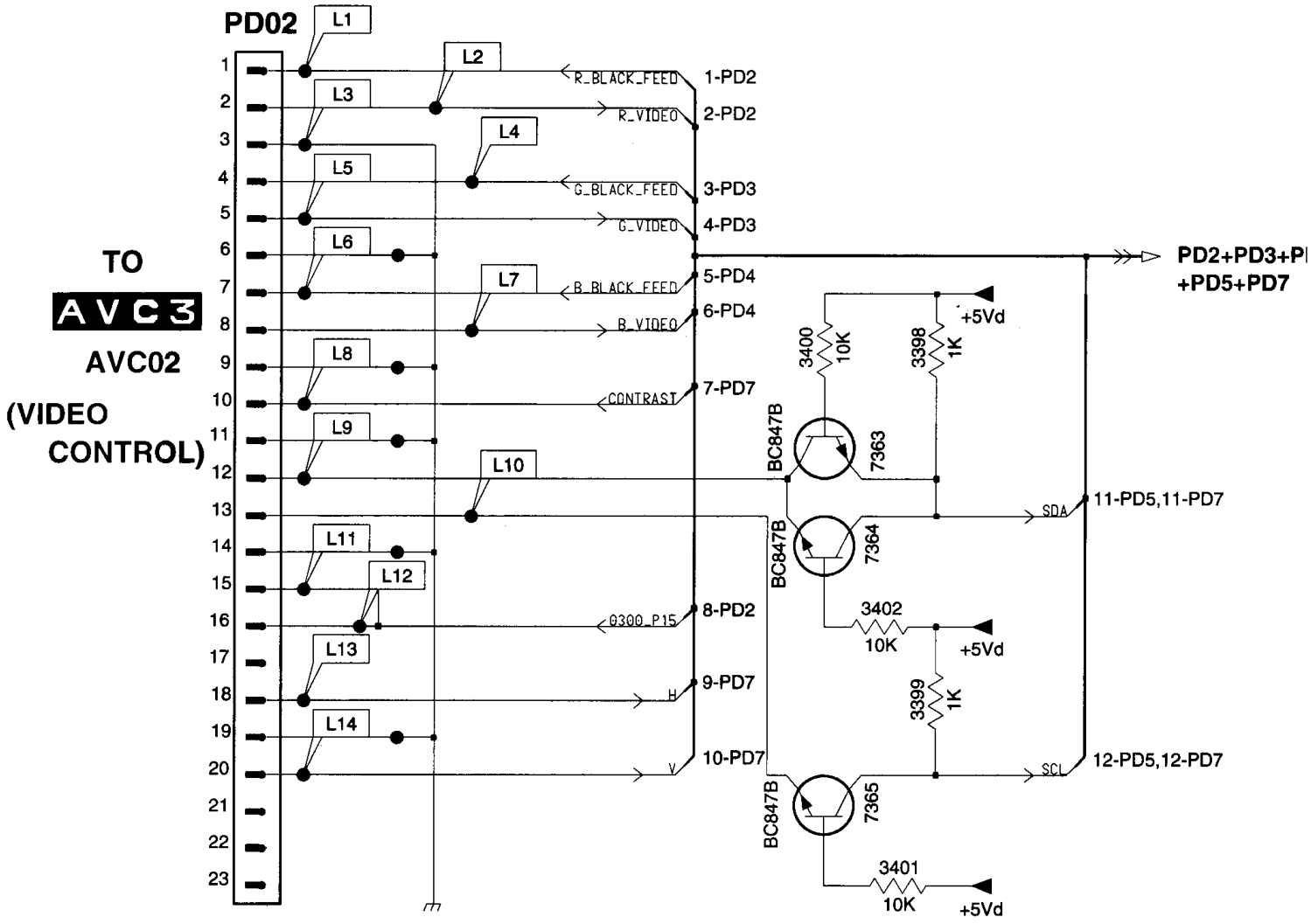


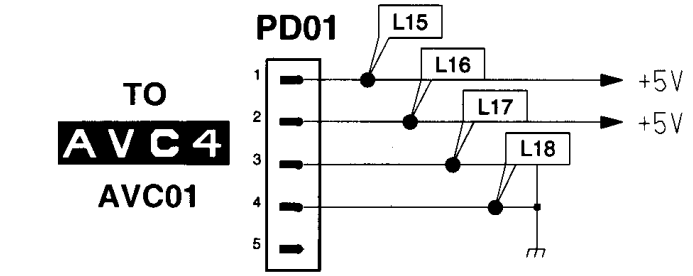
0306 D11
2200 C3
2201 C4
2202 C5
2203 B4
2204 C6
2205 C7
A 2206 D6
2207 C3
2212 D4
2215 D8
2220 F3
2221 F4
2222 F5
2223 E4
B 2224 G6
2225 F7
2226 H6
2227 G3
2231 C5
2232 G4
2234 D8
C 2235 H8
2236 B6
2237 D7
2238 B6
2240 D2
2241 G5
2244 G8
2246 E6
D 2247 G7
2248 F6
3200 B4
3201 C5
3202 C6
3205 C9
3206 C8
3207 C7
E 3208 D8
3209 D5
3210 D3
3211 D3
3212 C4
3213 C4
3216 C2
3218 F2
F 3220 F4
3221 G5
3222 F6
3225 F9
3226 G8
3227 G7
3228 H7
G 3229 H5
3230 H3
3231 G3
3232 G4
3233 F4
3236 A6
3237 B5
3238 B6
H 3239 B7
3240 D1
3241 D1
3242 D7
3244 H7
3246 E6
3247 E5
3248 E7
3249 E7
6200 D6
6208 D7
6220 H6
6228 H6
7200-A C5
7200-B C8
7202 D5
7203 E4
7220-A F5
7220-B F8
7222 H5
7223 H4
7250-A A6
7250-B E6

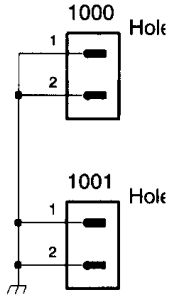
96532058_070.EPS
260899

PDP limesco

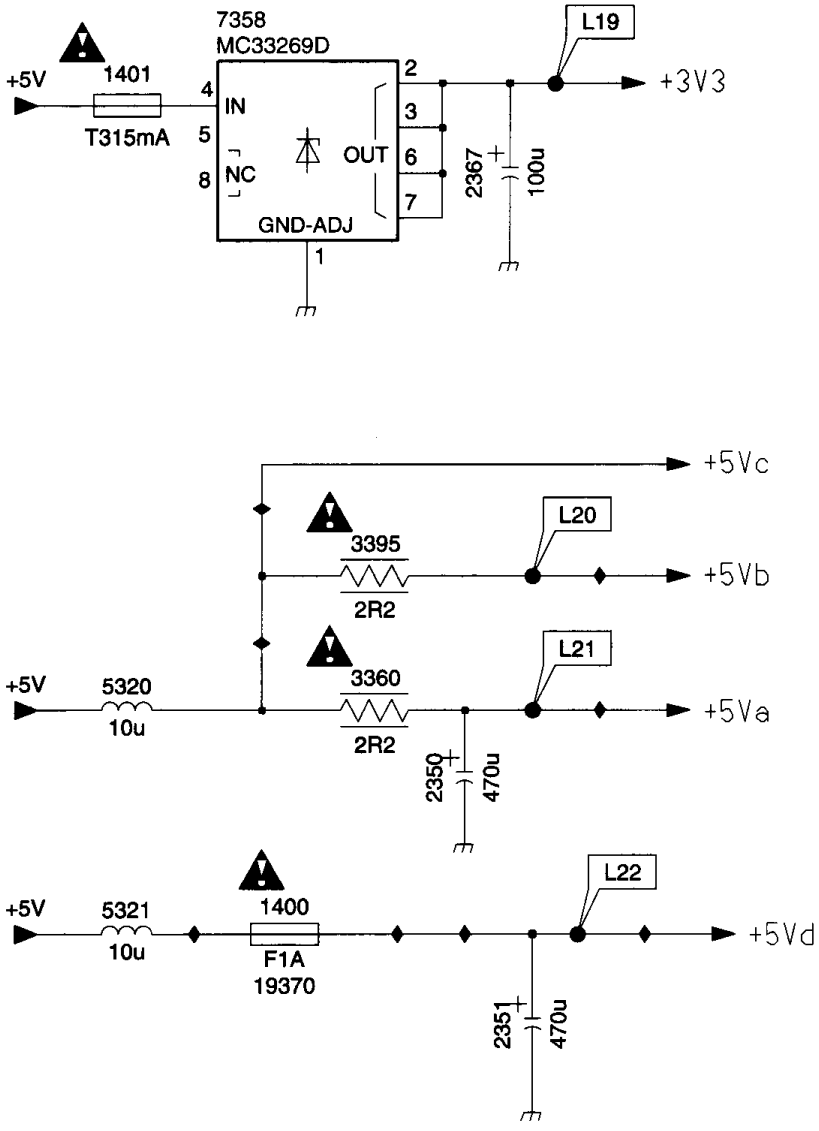
PD1 INTERCONNECT







1000 E5
1001 F5
1400 E7
1401 B6
2350 D7
2351 E8
2367 C7
3360 D7
3395 D7
3398 C4
3399 D4
3400 C3
3401 E4
3402 D4
5320 D6
5321 E6
7358 B7
7363 C4
7364 D4
7365 E4



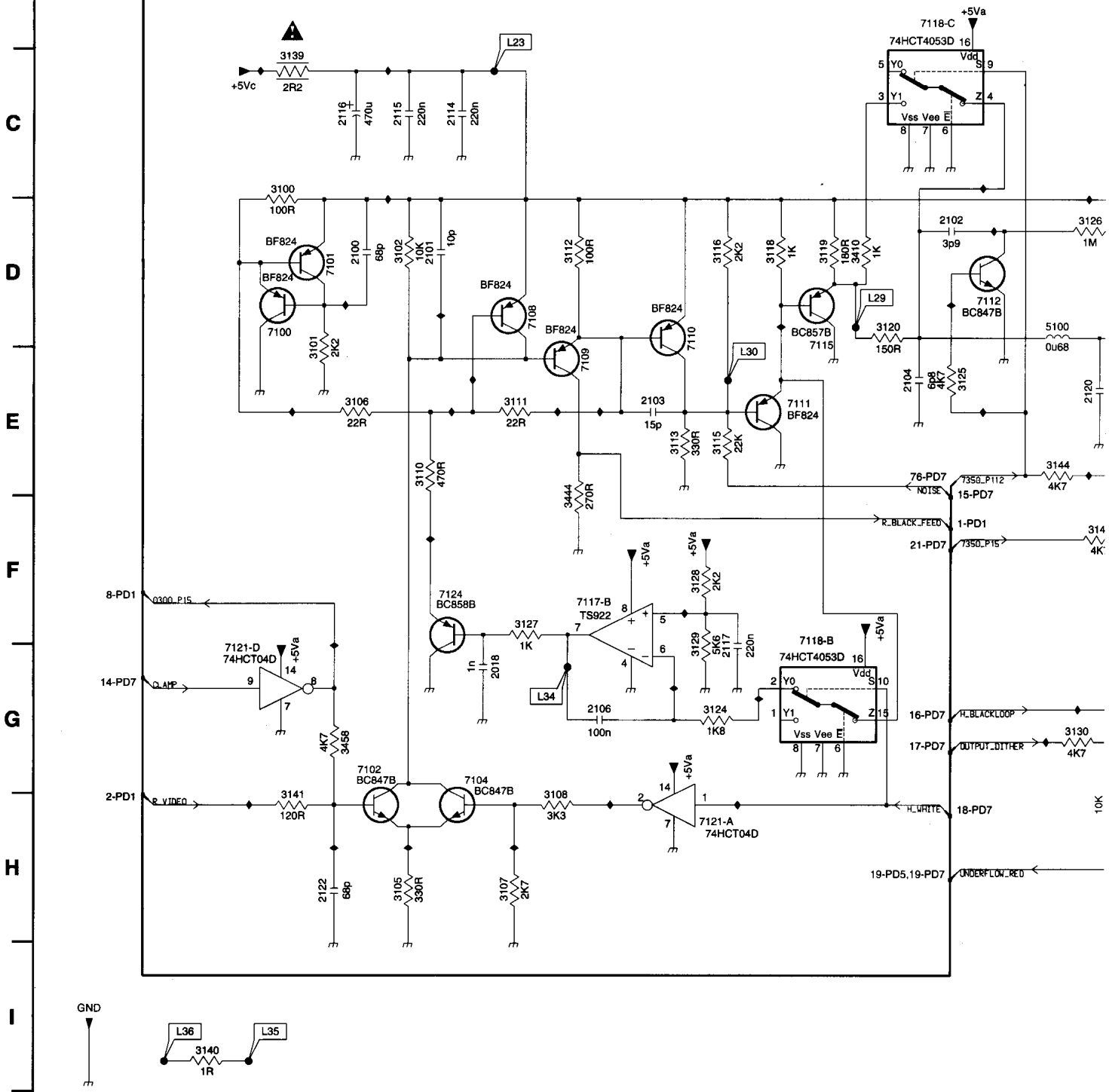
4.0 mm

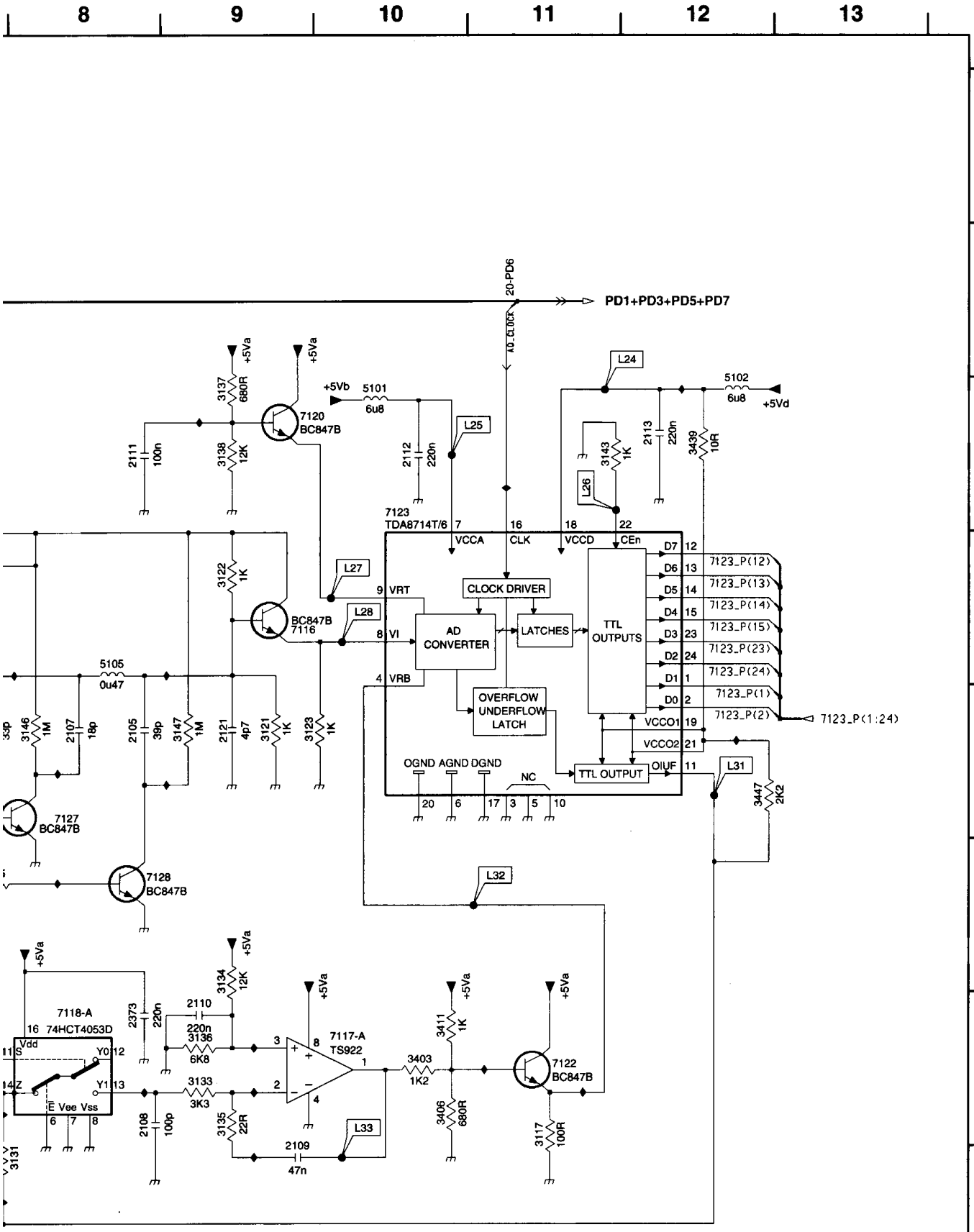
4.0 mm

96532058_073.EPS
270899

PDP limesco

PD2 RED GAMMA + ADC



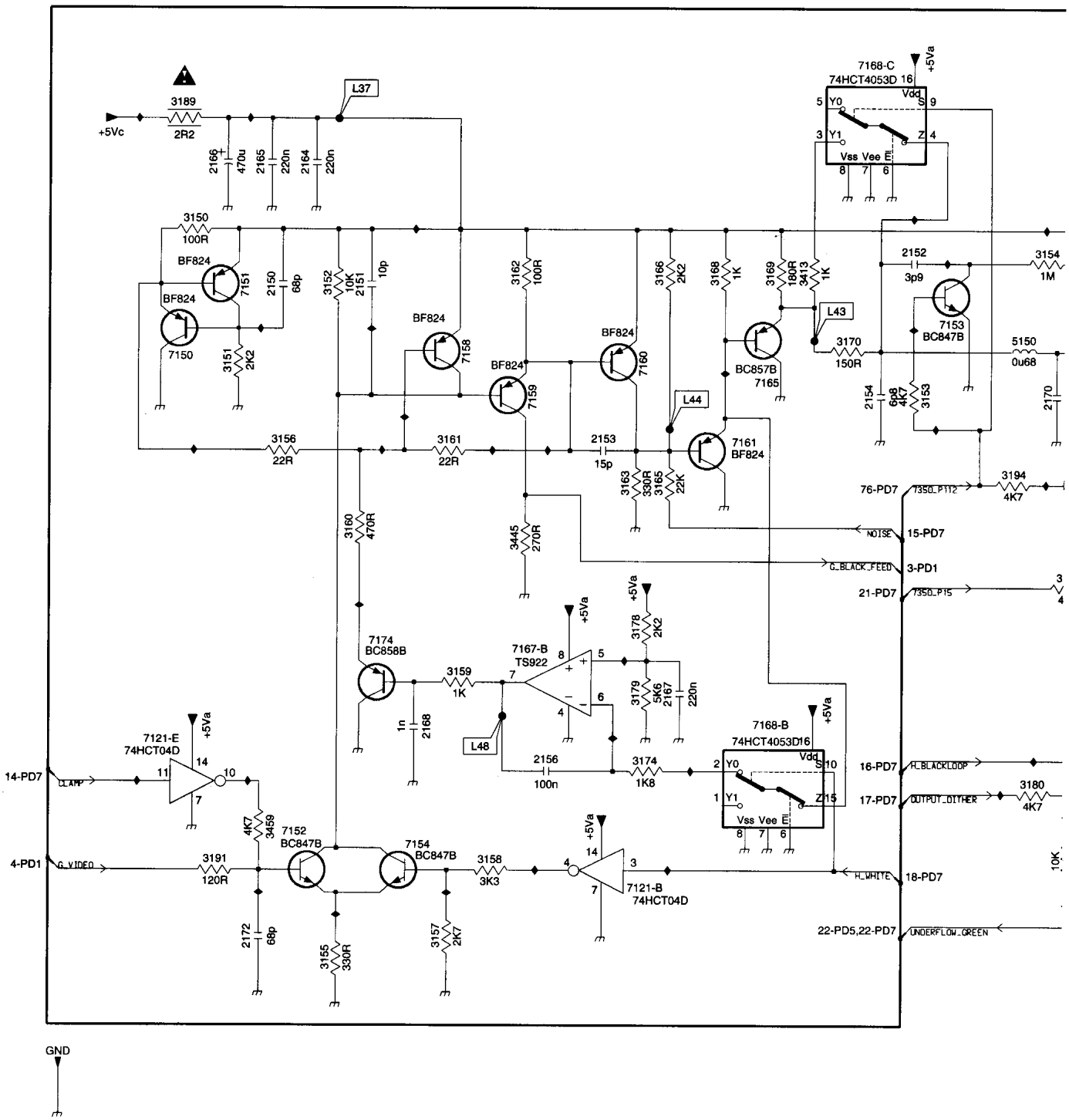


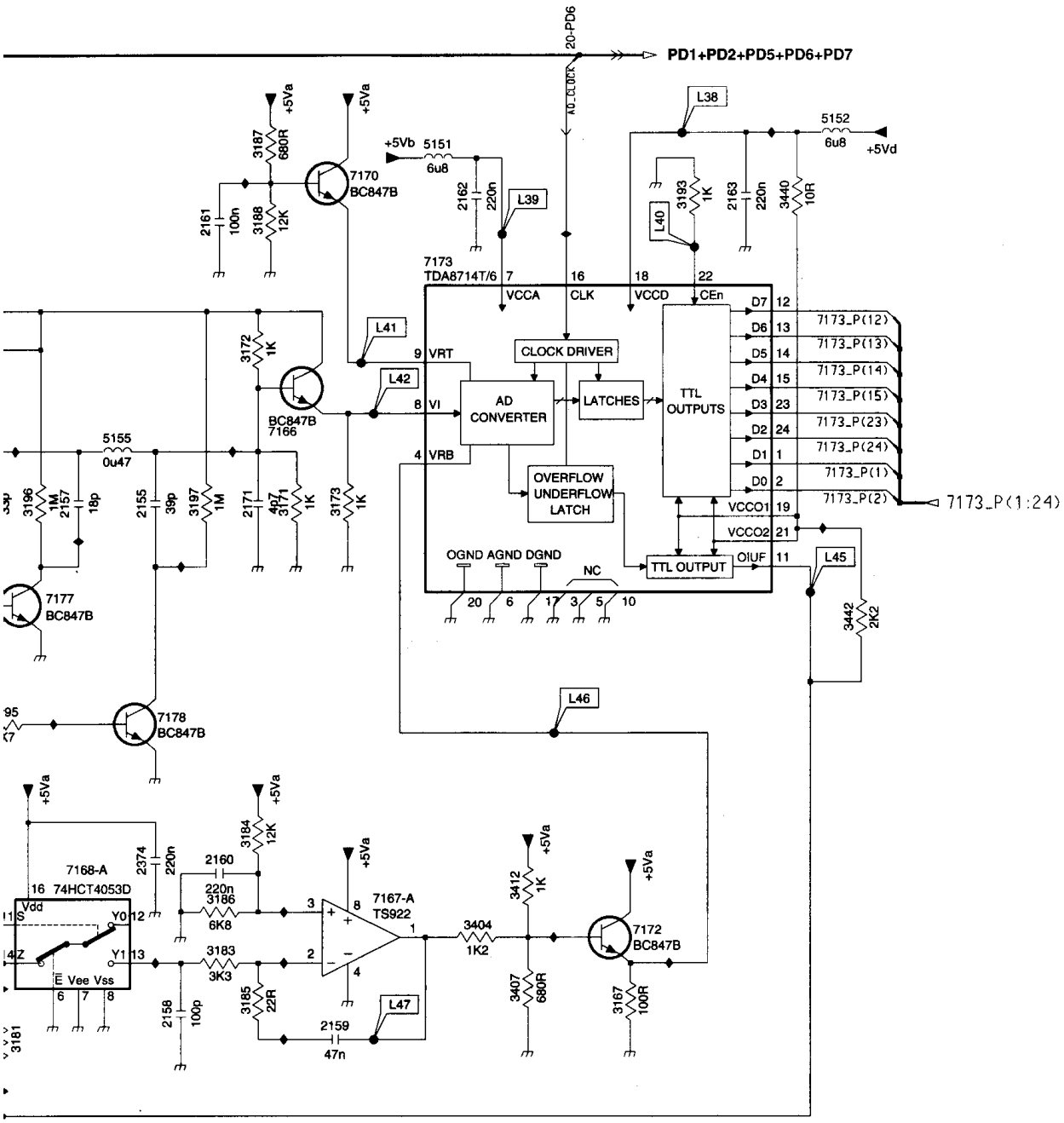
96532058_074.EPS
270899

2018 G3
2100 D2
2101 D3
2102 D6
2103 E4
2104 E6
2105 E8
2106 G4
2107 E8
2108 G8
2109 H9
2110 G9
2111 C8
2112 C10
2113 C12
2114 C3
2115 C3
2116 C2
2117 G5
2120 E7
2121 E9
2122 H2
2373 G8
3100 C2
3101 E2
3102 D3
3105 H3
3106 E2
3107 H3
3108 H4
3110 E3
3111 E3
3112 D4
3113 E5
3115 E5
3116 D5
3117 G11
3118 D5
3119 D6
3120 D6
3121 E9
3122 D9
3123 E9
3124 G5
3125 E6
3126 D7
3127 F4
3128 F5
3129 G5
3130 G7
3131 H8
3133 G9
3134 F9
3135 G9
3136 G9
3137 C9
3138 C9
3139 C2
3140 I1
3141 H2
3143 C11
3144 E7
3145 F7
3146 E8
3147 E9
3403 G10
3406 G10
3410 D6
3411 G10
3439 C12
3444 F4
3447 E12
3458 G2
5100 D7
5101 C10
5102 C12
5105 D8
7100 D2
7101 D2
7102 G2
7104 G3
7108 D4
7109 E4
7110 E5
7111 E5
7112 D7
7115 D5
7116 D10
7117-A G10
7117-B F4
7118-A G8
7118-B F5
7118-C B6
7120 C9
7121-A H5
7121-D G2
7122 G11
7123 C10
7124 F3
7127 E8
7128 F8

PDP limesco

PD3 GREEN GAMMA + ADC



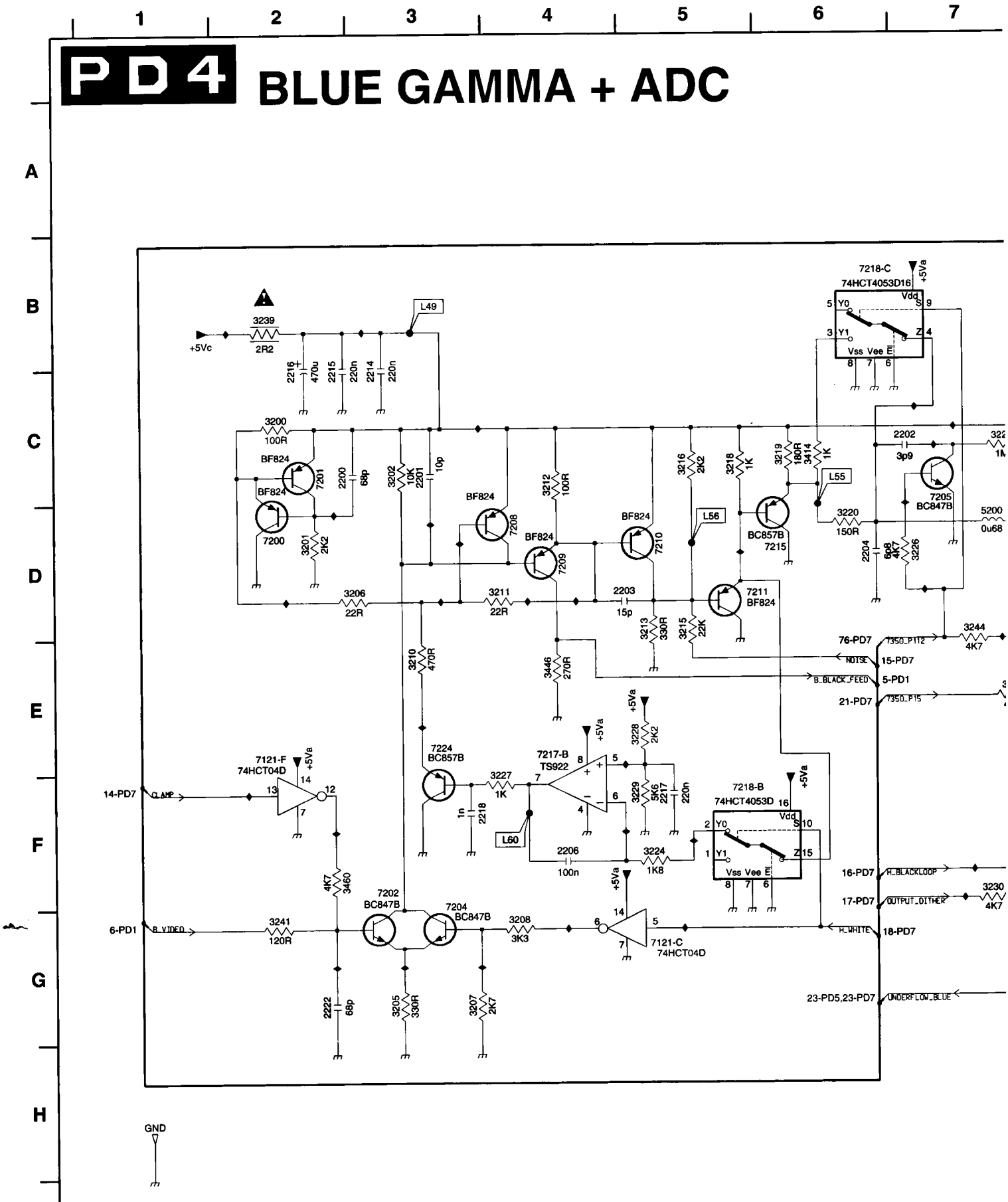


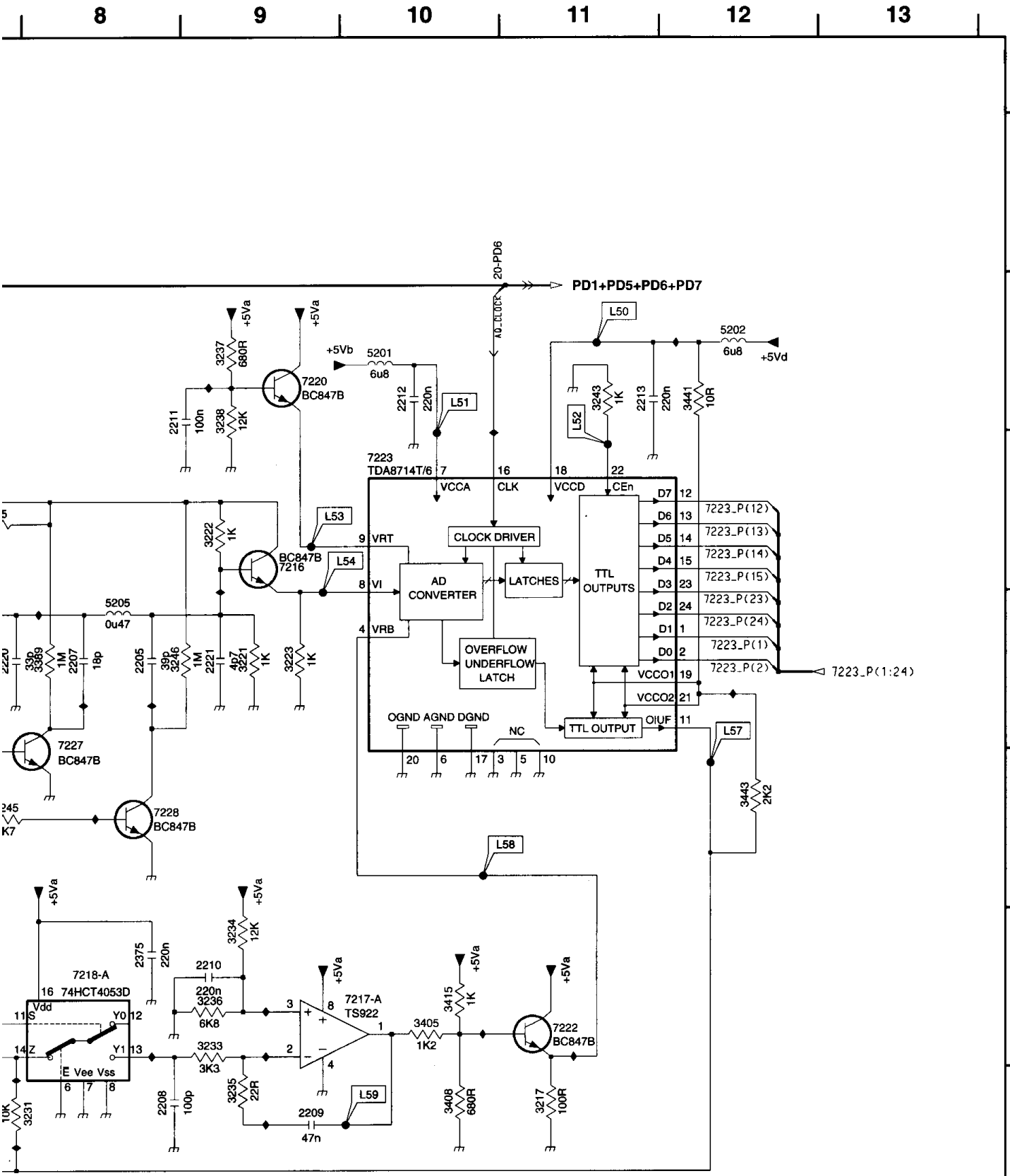
96532058_075.EPS
270899

2150 D2
2151 D3
2152 D7
2153 E5
2154 D6
2155 D8
2156 G4
2157 D8
2158 G8
2159 G9
2160 F9
2161 C9
2162 C10
2163 C12
2164 C3
2165 C2
2166 C2
2167 F5
2168 G3
2170 D7
2171 D9
2172 H2
2374 F8
3150 C2
3151 D2
3152 D3
3153 D7
3154 D7
3155 H3
3156 E2
3157 H3
3158 G4
3159 F4
3160 E3
3161 E4
3162 D4
3163 E5
3165 E5
3166 D5
3167 G11
3168 D5
3169 D6
3170 D6
3171 D9
3172 D9
3173 D9
3174 G5
3178 F5
3179 F5
3180 G7
3181 G8
3183 G9
3184 F9
3185 G9
3186 G9
3187 B9
3188 C9
3189 C2
3191 G2
3193 C11
3194 E7
3195 E8
3196 D8
3197 D9
3404 G10
3407 G10
3412 G10
3413 D6
3440 C12
3442 E12
3445 E4
3459 G2
5150 D7
5151 B10
5152 B12
5155 D8
7121-B H5
7121-E G2
7150 D2
7151 D2
7152 G2
7153 D7
7154 G3
7158 D4
7159 E4
7160 D5
7161 E5
7165 D5
7166 D9
7167-A G10
7167-B F4
7168-A F8
7168-B G6
7168-C B6
7170 C9
7172 G11
7173 C10
7174 F3
7177 E8
7178 E8

PDP limesco

PD4 BLUE GAMMA + ADC



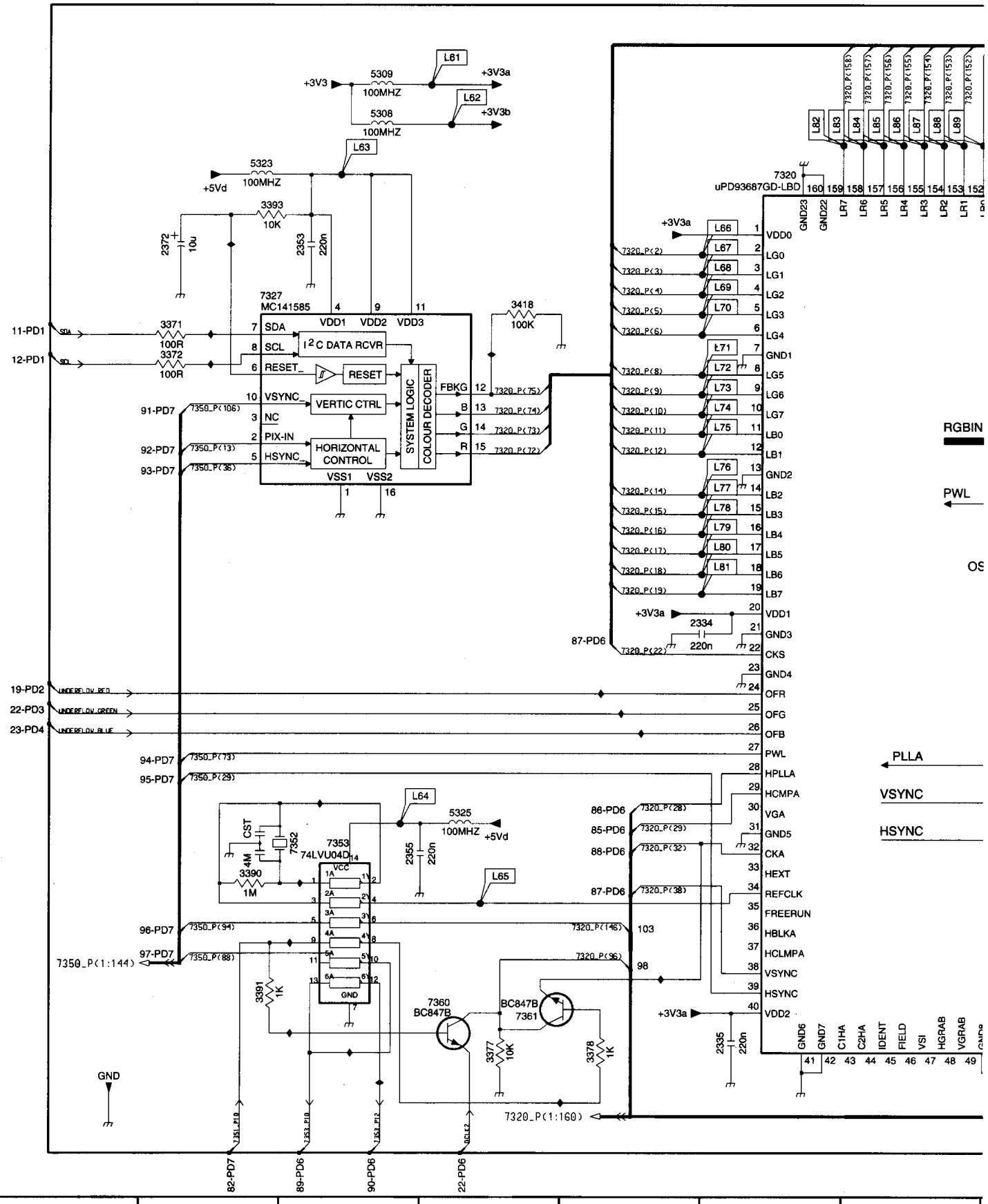


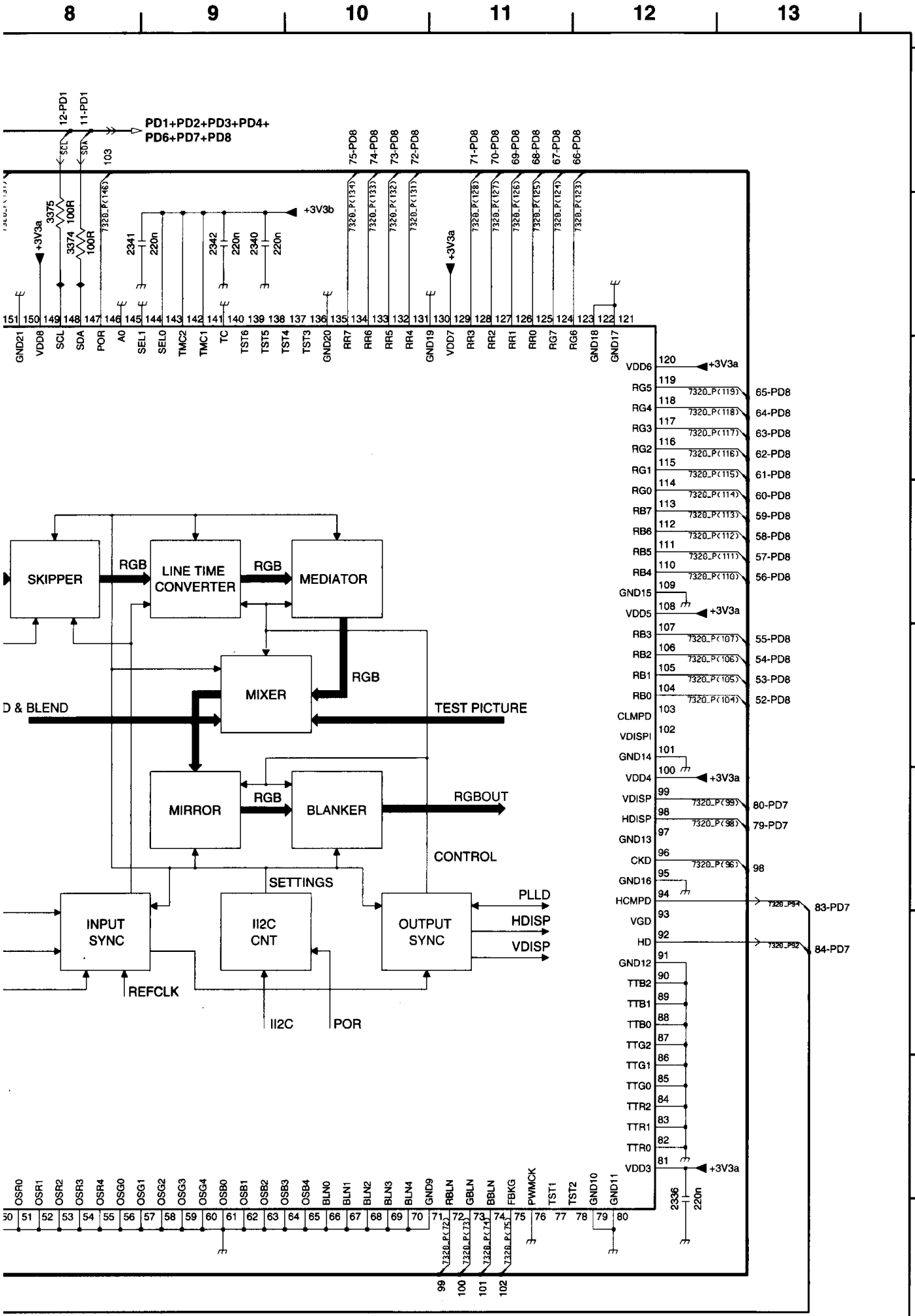
96532058_076.EPS
270899

2200 C2
2201 C3
2202 C7
2203 D5
2204 D6
2205 D8
2206 F4
2207 D8
2208 G8
2209 G9
2210 F9
2211 B8
2212 B10
2213 B11
2214 C3
2215 C2
2216 C2
2217 F5
2218 F3
2220 D7
2221 D9
2222 G2
2375 F8
3200 C2
3201 D2
3202 C3
3205 G3
3206 D3
3207 G3
3208 G4
3210 E3
3211 D4
3212 C4
3213 D5
3215 D5
3216 C5
3217 G11
3218 C5
3219 C6
3220 D6
3221 D9
3222 C9
3223 D9
3224 F5
3225 C7
3226 D7
3227 F4
3228 E5
3229 F5
3230 F7
3231 G8
3233 F9
3234 F9
3235 G9
3236 F9
3237 B9
3238 B9
3239 B2
3241 G2
3243 B11
3244 D7
3245 E8
3246 D8
3389 D8
3405 F10
3408 G10
3414 C6
3415 F10
3441 B12
3443 E12
3446 E4
3460 F2
5200 D7
5201 B10
5202 B12
5205 D8
7121-C G5
7121-F E2
7200 D2
7201 C2
7202 F3
7204 G3
7205 C7
7208 D4
7209 D4
7210 D5
7211 D5
7215 D6
7216 C9
7217-A F10
7217-B E4
7218-A F8
7218-B F5
7218-C B6
7220 B9
7222 F11
7223 C10
7224 E3
7227 D8
7228 E8

PDP limesco

PD5 SCAN CONVERTER + OSD

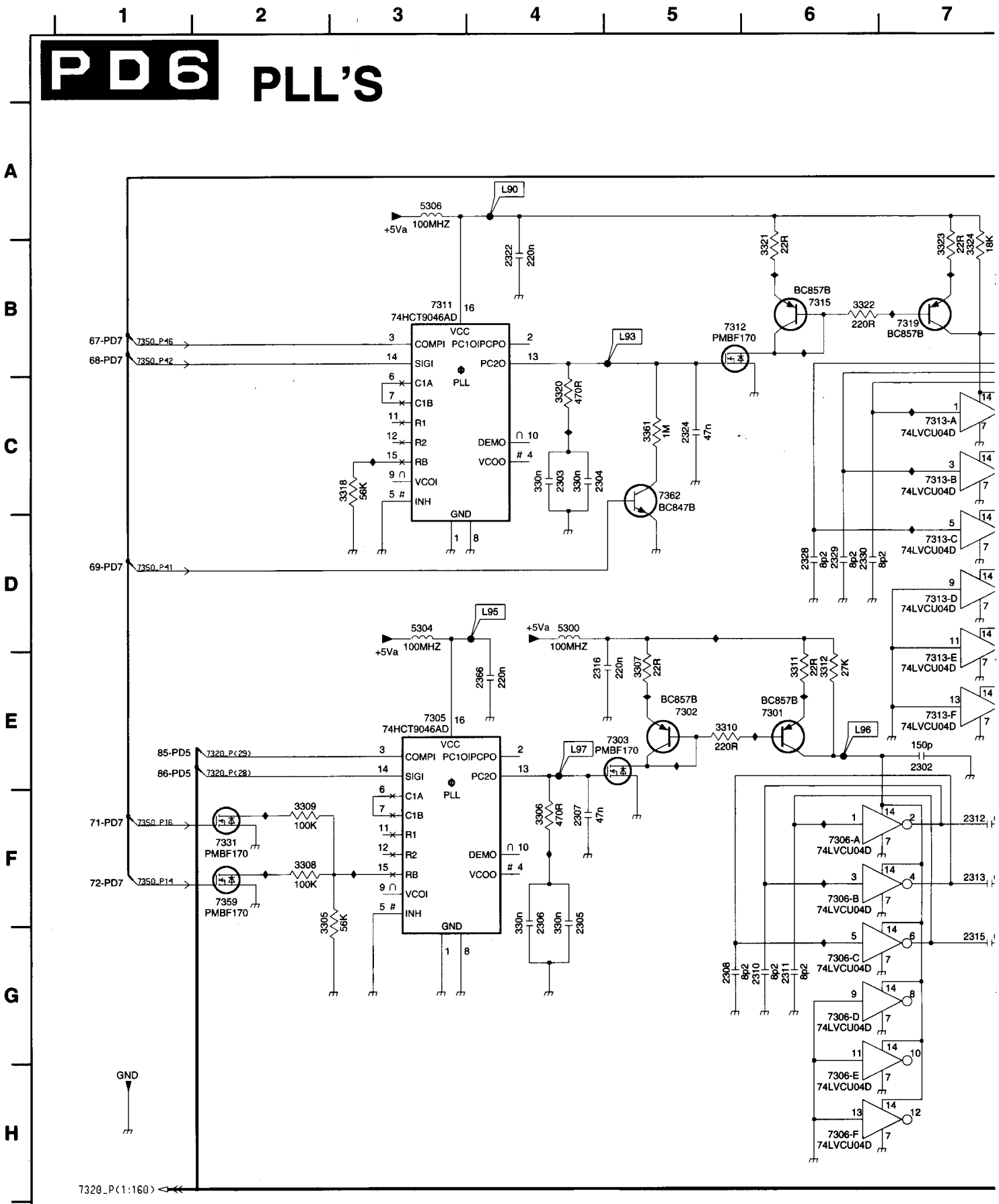


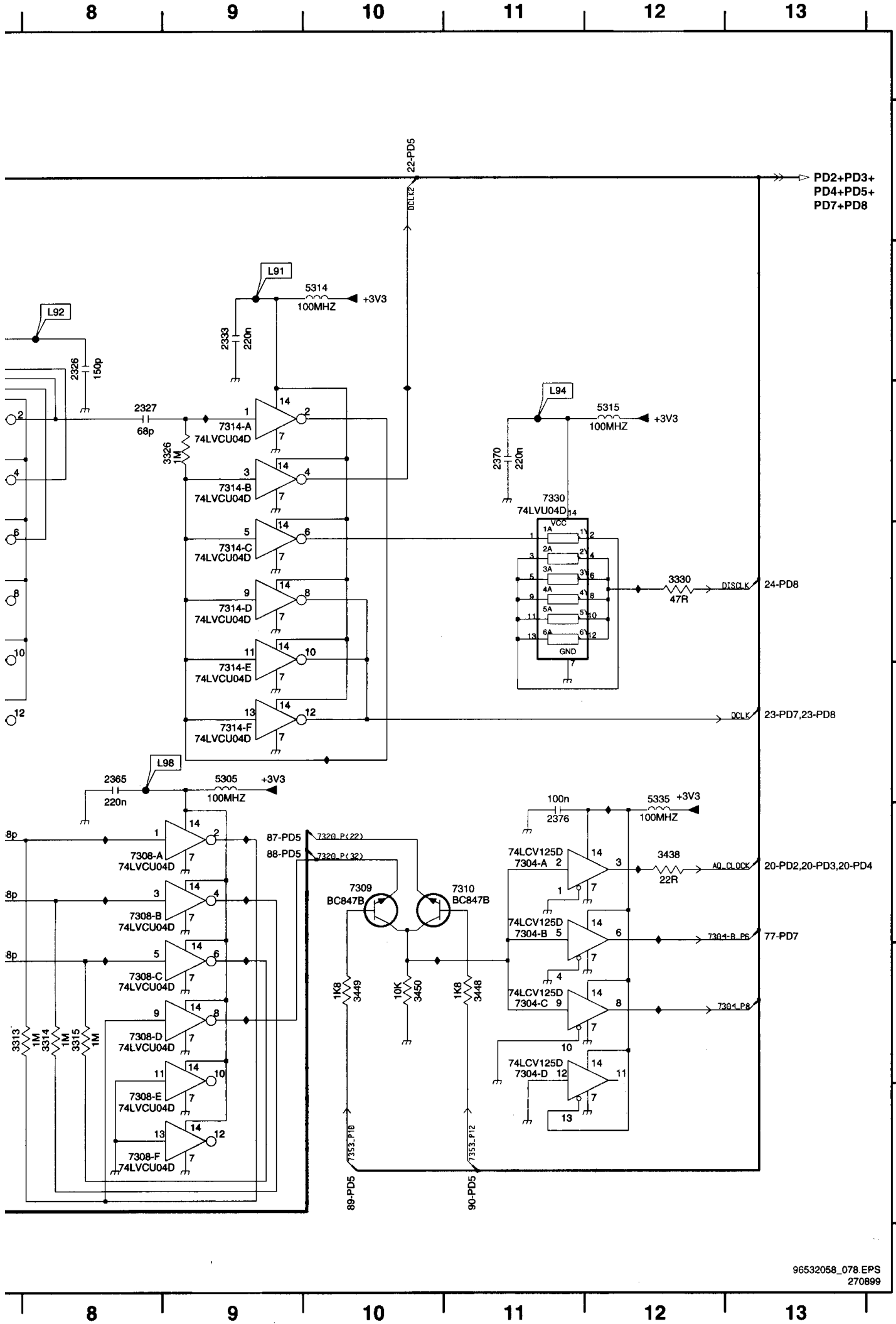

PD1+PD2+PD3+PD4+
PD6+PD7+PD8
12-PD1
11-PD1
+3V3a
+3V3b
3375 100R
3374 100R
2341 220n
2342 220n
2340 220n
SKIPPER
LINE TIME CONVERTER
MEDIATOR
MIXER
MIRROR
BLANKER
INPUT SYNC
II2C CNT
OUTPUT SYNC
RGB
RGBOUT
CONTROL
SETTINGS
TEST PICTURE
D & BLEND
PLLD
HDISP
VDISP
REFCLK
II2C
POR
GND21 VDD8 SCL SDA POR A0 SEL1 SEL0 TMC2 TMC1 TC TST6 TST5 TST4 TST3 GND20 RR7 RR6 RR5 RR4 GND19 VDD7 RR3 RR2 RR1 RR0 RG7 RG6 GND18 GND17
VDD6 RG5 RG4 RG3 RG2 RG1 RG0 RB7 RB6 RB5 RB4 GND15 VDD5 RB3 RB2 RB1 RB0 CLMPD VDISPI GND14 VDD4 VDISP HDISP GND13 CKD GND16 HCMPD VGD HD GND12 TTB2 TTB1 TTB0 TTG2 TTG1 TTG0 TTR2 TTR1 TTR0 VDD3
OSR0 OSR1 OSR2 OSR3 OSR4 OSG0 OSG1 OSG2 OSG3 OSG4 OSB0 OSB1 OSB2 OSB3 OSB4 BLN0 BLN1 BLN2 BLN3 BLN4 GND9 RBLN GBLN BBLN FBKG PWMCK TST1 TST2 GND10 GND11
2336 220n
65-PD8 64-PD8 63-PD8 62-PD8 61-PD8 60-PD8 59-PD8 58-PD8 57-PD8 56-PD8 55-PD8 54-PD8 53-PD8 52-PD8 80-PD7 79-PD7 98 83-PD7 84-PD7
75-PD8 74-PD8 73-PD8 72-PD8 71-PD8 70-PD8 69-PD8 68-PD8 67-PD8 66-PD8
96532058_077.EPS
270899

2334 F6
2335 I6
2336 I12
2340 B9
2341 B8
2342 B9
2353 C3
2355 G3
2372 C2
3371 C2
3372 D2
3374 B8
3375 B8
3377 I4
3378 I5
3390 G2
3391 H2
3393 C2
3418 C4
5308 B3
5309 B3
5323 B2
5325 G4
7320 B6
7327 C2
7352 G3
7353 G3
7360 H4
7361 H4

PDP limesco

PD6 PLL'S

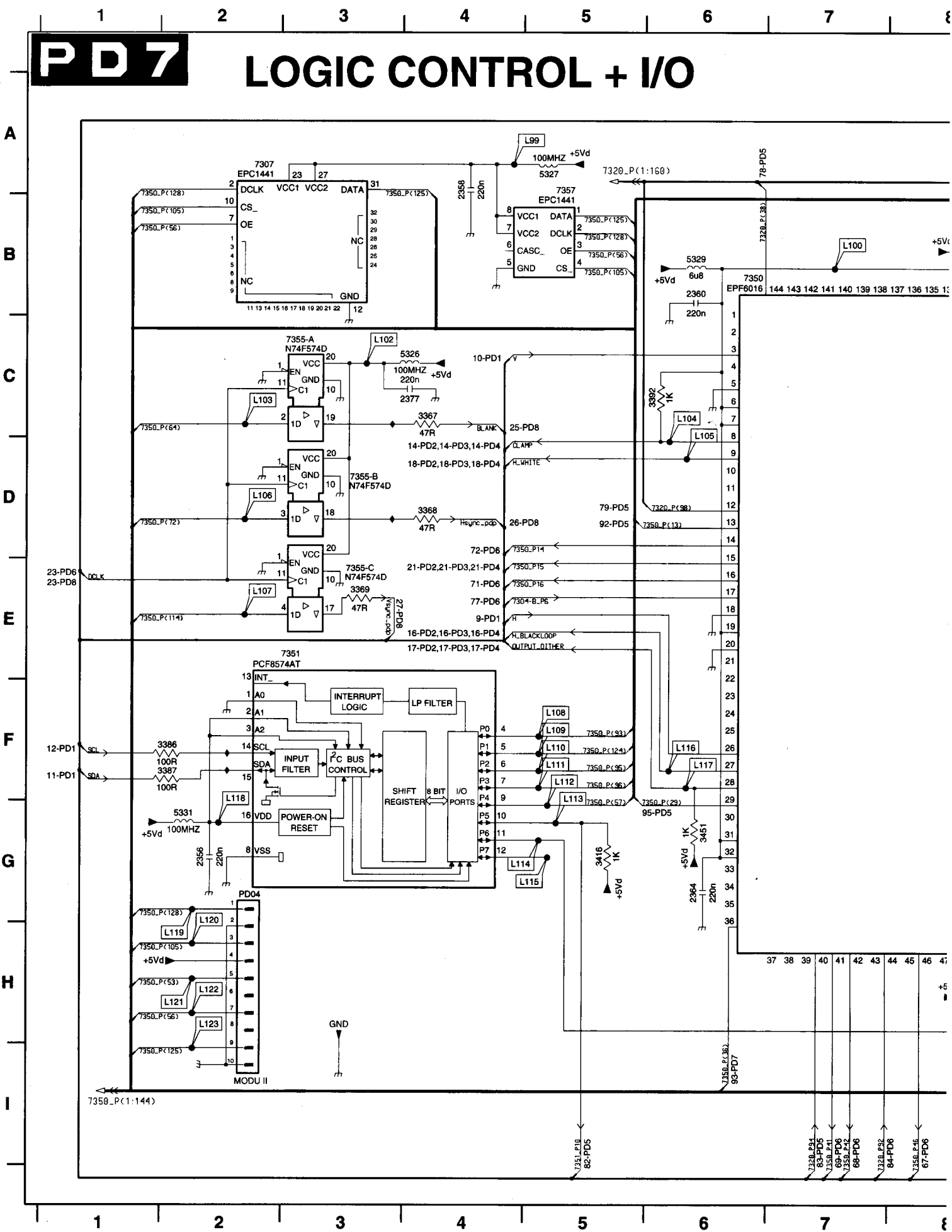


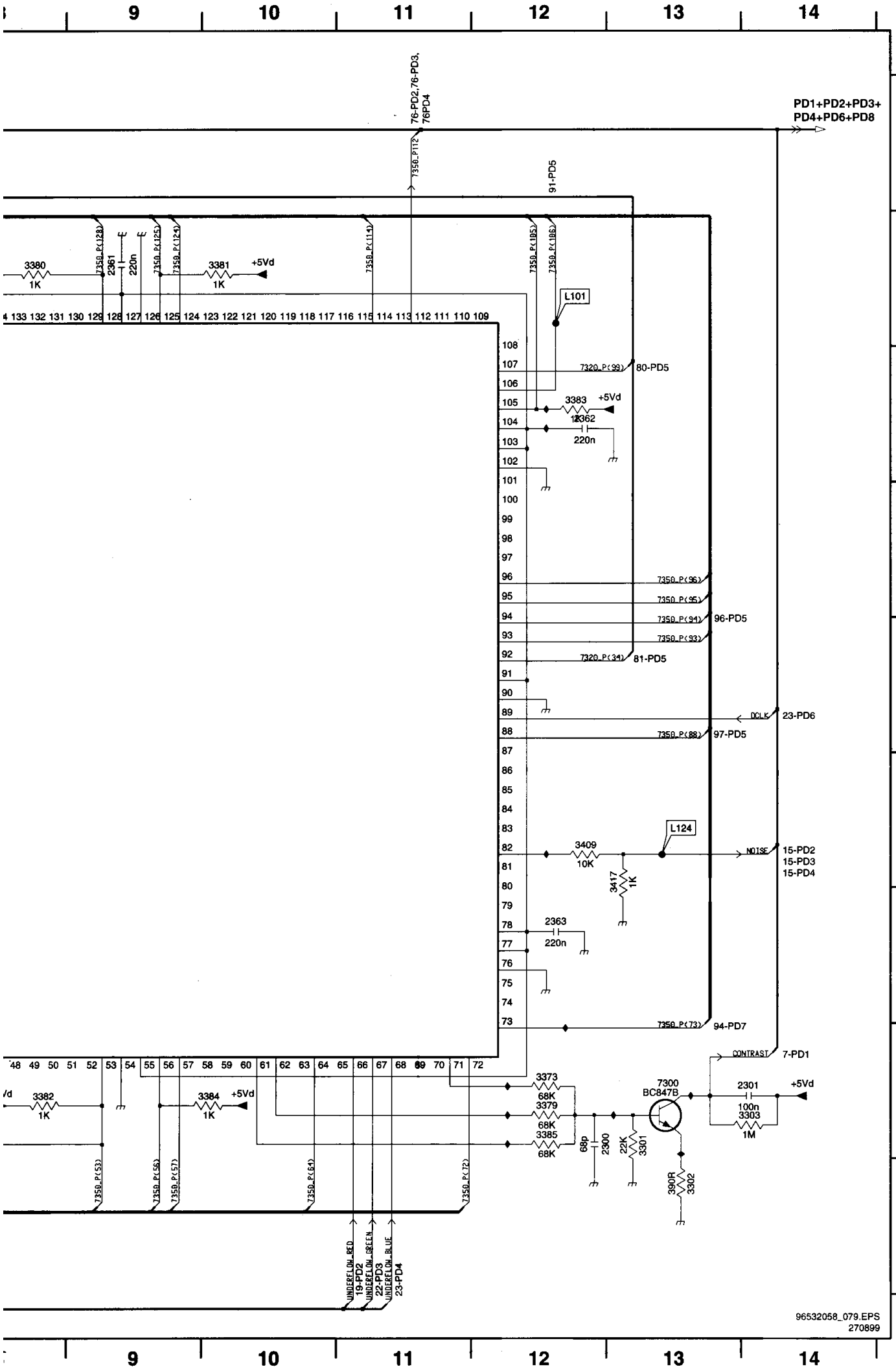


2302 E7
2303 C4
2304 C4
2305 F4
2306 F4
2307 F4
2308 G5
2310 G6
2311 G6
2312 F7
2313 F7
2315 G7
2316 E4
2322 B4
2324 C5
2326 B8
2327 C8
2328 D6
2329 D6
2330 D6
2333 B9
2365 E8
2366 E4
2370 C11
2376 F11
3305 F2
3306 F4
3307 E5
3308 F2
3309 F2
3310 E5
3311 E6
3312 E6
3313 G7
3314 G8
3315 G8
3318 C3
3320 C4
3321 B6
3322 B6
3323 B7
3324 B7
3326 C9
3330 D12
3361 C5
3438 F12
3448 G11
3449 G10
3450 G10
4000 G11
5300 D4
5304 D3
5305 E9
5306 A3
5314 B10
5315 C12
5335 E12
7301 E6
7302 E5
7303 E5
7304-A F11
7304-B F11
7304-C G11
7304-D G11
7305 E3
7306-A F6
7306-B F6
7306-C G6
7306-D G6
7306-E H6
7306-F H6
7308-A F8
7308-B F8
7308-C G8
7308-D G8
7308-E H8
7308-F H8
7309 F10
7310 F11
7311 B3
7312 B5
7313-A C7
7313-B C7
7313-C D7
7313-D D7
7313-E E7
7313-F E7
7314-A C9
7314-B C9
7314-C D9
7314-D D9
7314-E E9
7314-F E9
7315 B6
7319 B7
7330 C11
7331 F2
7359 F2
7362 C5

PDP limesco

PD7 LOGIC CONTROL + I/O

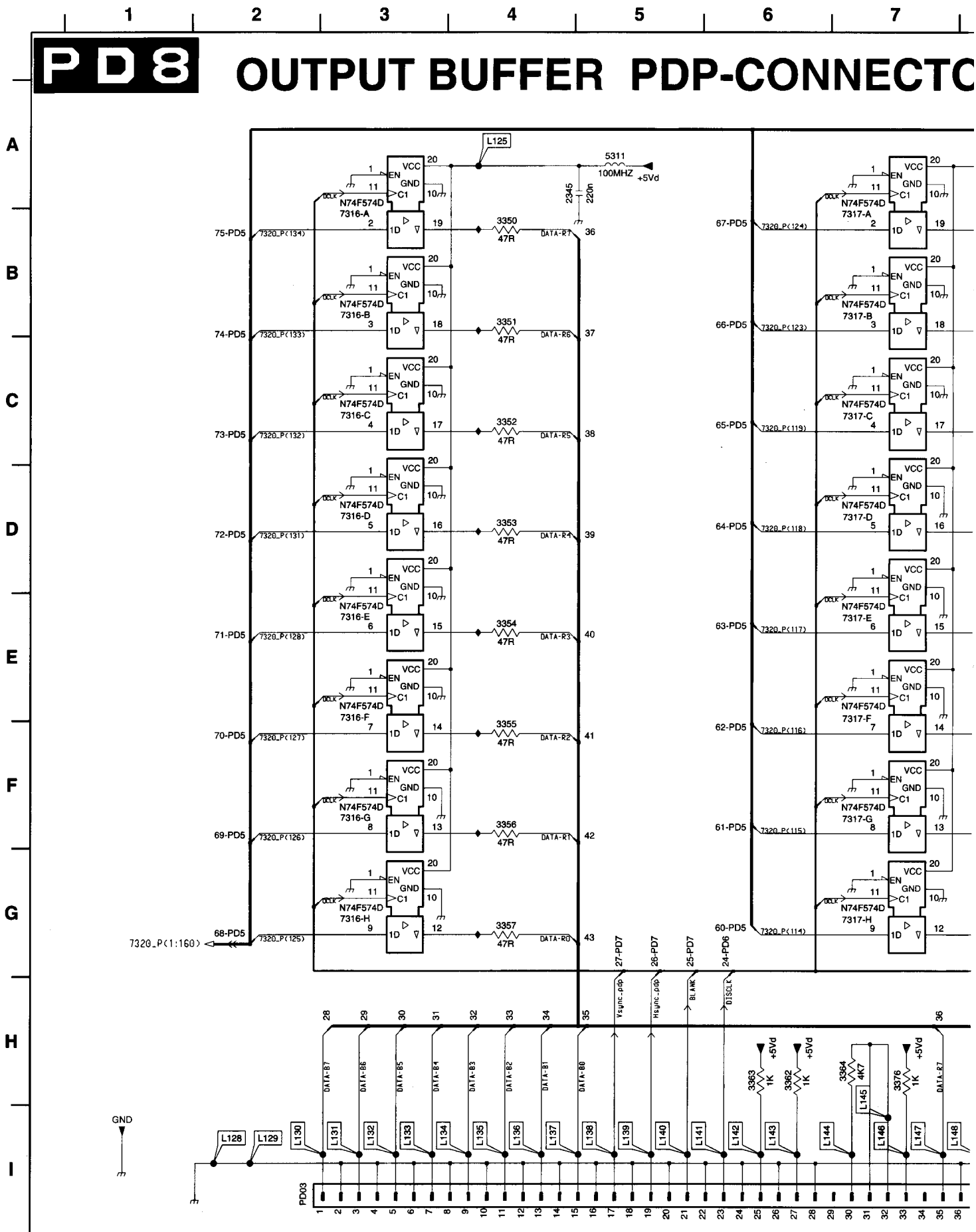


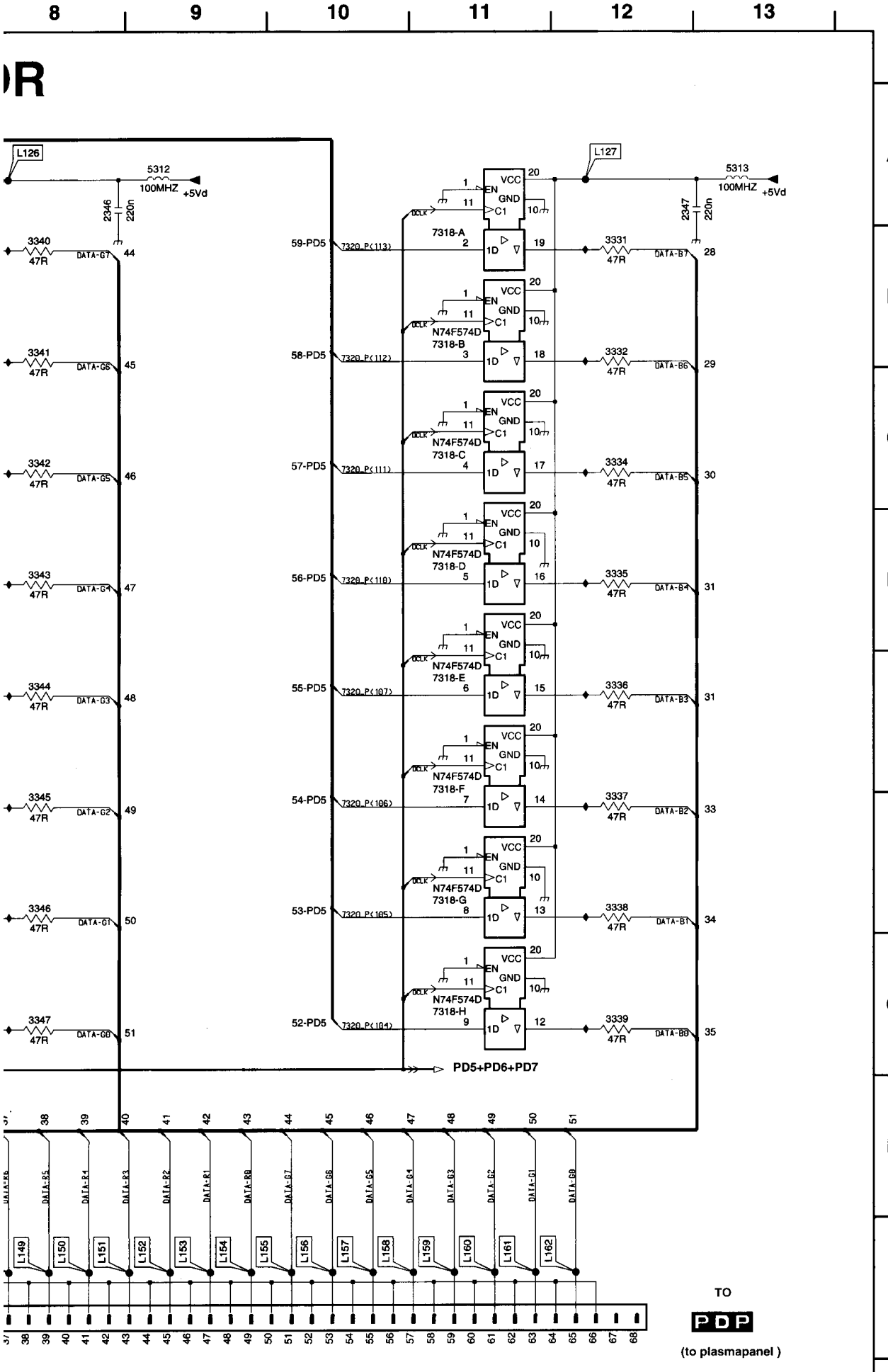


2300 H12
2301 H14
2356 G2
2358 A4
2360 B6
2361 B9
2362 C12
2363 G12
2364 G6
2377 C4
3301 H13
3302 I13
3303 H14
3367 C4
3368 D4
3369 E4
3373 H12
3379 H12
3380 B8
3381 B10
3382 H8
3383 C12
3384 H10
3385 H12
3386 F2
3387 F2
3392 C6
3409 F12
3416 G5
3417 F13
3451 G6
5326 C4
5327 A5
5329 B6
5331 G2
7300 H13
7307 A2
7350 B6
7351 E2
7355-A C3
7355-B D3
7355-C E3
7357 A5

PDP limesco

PD8 OUTPUT BUFFER PDP-CONNECTO

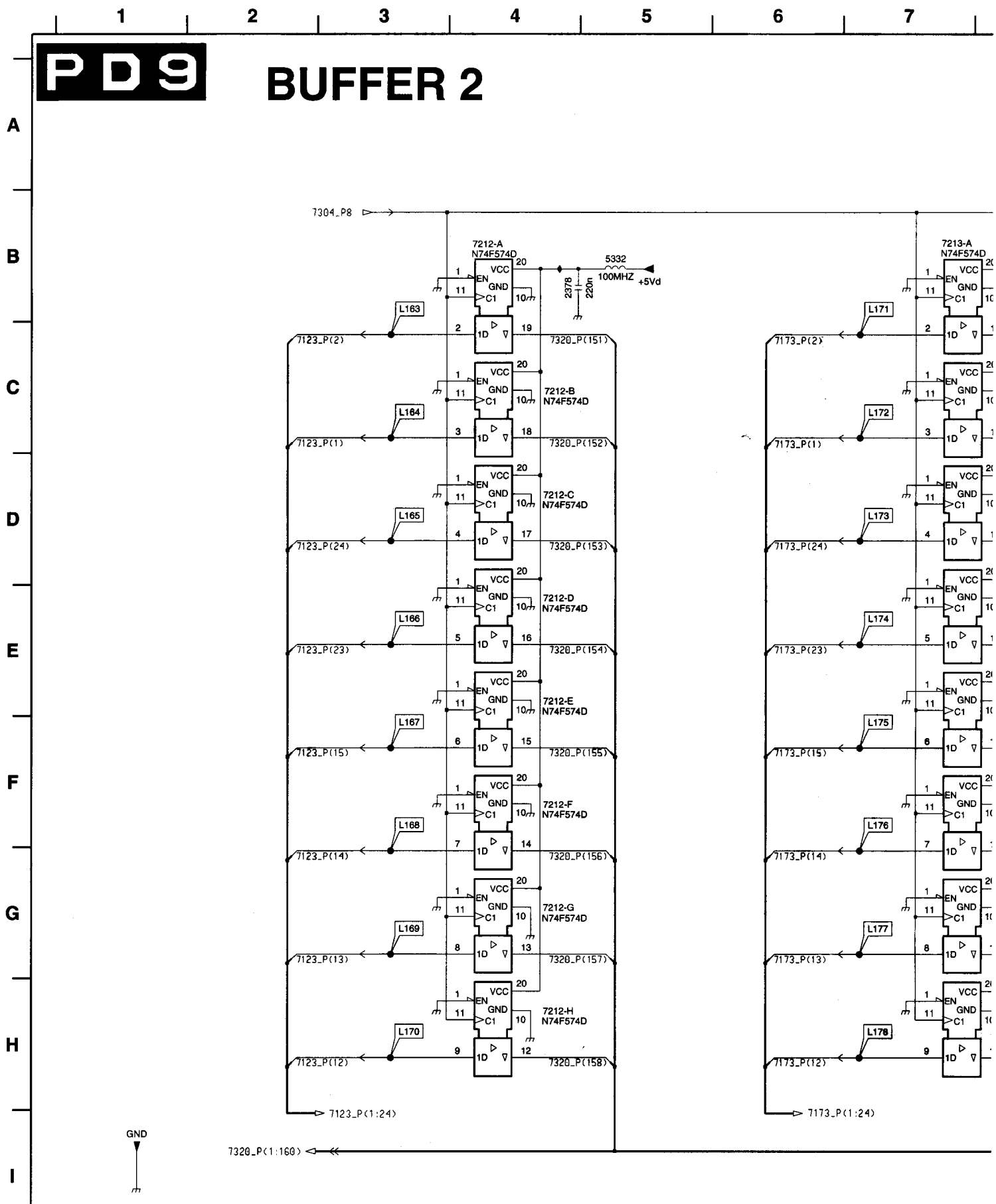


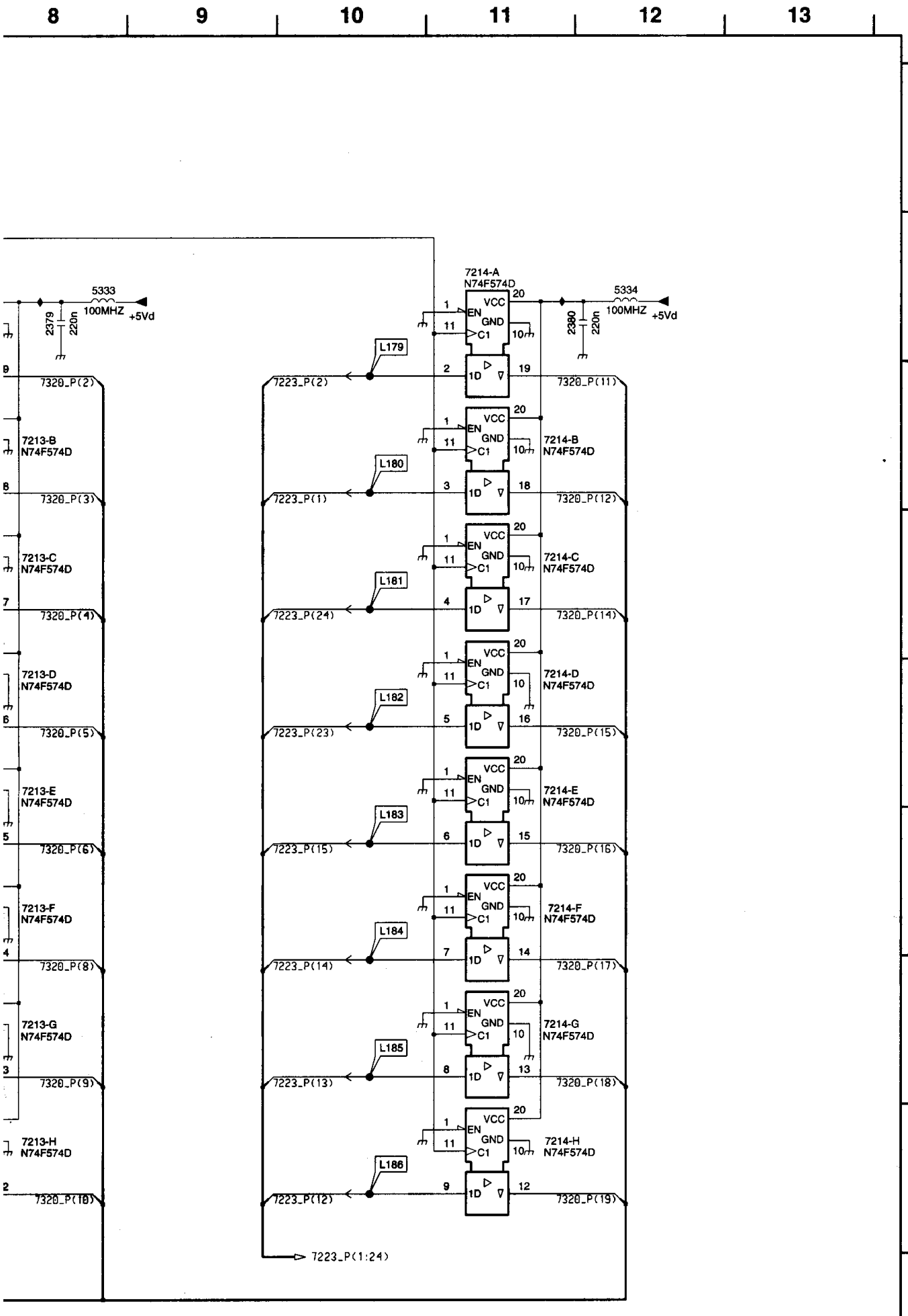


2345 B5
2346 B8
2347 B13
3331 B12
3332 C12
3334 C12
3335 D12
3336 E12
3337 F12
3338 G12
3339 G12
3340 B8
3341 C8
3342 C8
3343 D8
3344 E8
3345 F8
3346 G8
3347 G8
3350 B4
3351 C4
3352 C4
3353 D4
3354 E4
3355 F4
3356 G4
3357 G4
3362 I6
3363 I6
3364 I7
3376 I7
5311 A5
5312 A9
5313 A13
7316-A B3
7316-B C3
7316-C C3
7316-D D3
7316-E E3
7316-F F3
7316-G G3
7316-H G3
7317-A B7
7317-B C7
7317-C C7
7317-D D7
7317-E E7
7317-F F7
7317-G G7
7317-H G7
7318-A B11
7318-B C11
7318-C C11
7318-D D11
7318-E E11
7318-F F11
7318-G G11
7318-H G11

PDP limesco

PD9 BUFFER 2





2378 B4
2379 B8
2380 B11
5332 B5
5333 B8
5334 B12
7212-A B4
7212-B C4
7212-C D4
7212-D E4
7212-E E4
7212-F F4
7212-G G4
7212-H H4
7213-A B7
7213-B C8
7213-C D8
7213-D E8
7213-E E8
7213-F F8
7213-G G8
7213-H H8
7214-A B11
7214-B C11
7214-C D11
7214-D E11
7214-E E11
7214-F F11
7214-G G11
7214-H H11

CL96532058_090.eps
280999

8. Alignments

General: the Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5 'Service modes, faultfinding and repair tips'.

8.1 Alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage : 220 - 240 VAC (+/- 10 %)
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: Ri > 10MΩ Ci < 2,5 pF.

8.1.1 Selection of the SAM-menu

- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool, followed by password "3140" and < OK > button.
- Standard RC sequence 062596 (within OSD time-out) OSD
- By shorting test-point M28 and M29 on the AV Control panel on the monitor while switching on the set.

8.2 Adjustments on the D-box

8.2.1 Electrical Alignments

Pre-conditioner +5Vstby (PR3)
Connect a voltmeter to capacitor C2510 (PR2). With the aid of R3504 adjust the voltage to 5.2 V +/- 50 mV.

VsVa supply (FD)

Va-supply (Addressing of the PDP - FD1)
De-activated the PDP.
Connect a voltmeter to capacitor C2120 (FD1). With the aid of R3126 adjust the voltage to 55 V +/- 0.5 V.

Vs-supply (Sustain pulses - FD2)
De-activated the PDP.
Connect a voltmeter to capacitor C2020 (FD2). With the aid of R3026 adjust the voltage to 165 V +/- 0.5 V.

8.2.2 Software Alignments

White point

- Select the item "PDP test pattern" of the Service Alignment menu and set it to "ON.
- Select item " White point" of the Service Alignment menu.
- Enter the "white point" menu and adjust the value of one of the 4 submenu if necessary. Only the selected menu-item including its value remain on the screen when selected. The value has to changed within 5 seconds otherwise the main menu reappears again.

The 4 sub menu-items of the White point menu:

- "RED"
- "GREEN"
- "BLUE"
- "COLOUR TEMPERATURE"

- Leave the sub-menu by pressing "cursor up", "cursor down", "OK" or the "MenuOnOff" button and return to the main menu.
- Select the item "PDP test pattern" of the Service Alignment menu and set it to "OFF.

9. Circuit description and list of abbreviations

9.1 Circuit description

For a detailed description of the circuits see Training Manual FTV1.9 Display Box (3122 785 10036).

9.2 List of abbreviations

µP	Micro Processor
1FH	One time the line frequency for normal picture quality
2FH	Twice the line frequency for a better picture with less field flicker
2CS	2 Carrier Sound (sound system using two separate FM carriers at 5.5 MHz)
AARA	Automatic Aspect Ratio Adaptation
ADC	Analogue Digital Converter
ADJ	Adjust -
AFC	(S1) Automatic Frequency Control. Automatic fine-tuning circuit for signal reception.
AGC	Automatic Gain Control
AM	Amplitude Modulation
AMV	Automatic Multi Voltage
ANT	Antenna
AP	Asian Pacific region (Covering Hong Kong, Australia, Singapore etc.)
APC	Automatic Power Control
ASP	Aspect Ratio 4:3 or 14:9 or 16:9
AUD	Audio - GFL
AVB	Audio Video Buffer or Audio Video Blanking
BC	Beam current - GFL
BNC	Professional connector for higher frequencies
C	Centre
CINCH	Common connector for several kinds of signals
COMP	COMB-filter
CRT	Cathode Ray Tube
CVBS	Composite Video Blanking Synchronisation, video signal
DAC	Digital Analogue Converter
DEC	Decoder
DFB	Double Window Fast Blanking
DU	Double Window - U_signal
DV	Double Window - V_signal
DW	Double Window
DY	Double Window - Y_signal
E-Box	Electronic Box
EHT	Extra High Tension - GFL
ELPS	Eco Low Power Supply - GFL
EWD	East West Drive - GFL
EXT	External
FBL	Fast Blinking
FBX	Feature Box
FE	FrontEnd
FM	Frequency Modulation
FMS	Functional Module Specification
FRNT	Front
FRS	Functional Requirement Specification
FTV	Flat TeleVision
GFL	Global Feature Line (high end TV chassis)
GFL-FL	GFL Feature (up)Lift
GND	Ground
HFB	Horizontal FlyBack (display system sync. pulse)
HP	Headphone
HSI	Hardware Software Interface
HW	HardWare
I/O	Input / Output
I2C	IC bus, Inter Integrated circuit, on-board communication line
IF	Intermediate Frequency
IRQ	Interrupt ReQuest.
L	Left
L_CL VL	Left_Constant_Level Variable_Level
L_REC SEL	Left_Record_Select
LED	Light Emitting Diode
LP	Low Pass
LTP	Luminance Transient Processor
MAC	(Apple) MACintosh
MAC13	or MACII (Apple) MACintosh format for 13" monitors
MACP	Motion Adaptive Colour Plus
ML-2	Media Line 2
Monitor	PDP Display with all the electronic boards (incl. self developed boards).
MU	Main U_signal
MV	Main V_signal
MY	Main Y_signal
NICAM	Near Instantaneous Companding Audio Multiplex (digital terrestrial sound
NTSC	National TV Standard Committee
OE	(AQ) Output Enable
PAL	Phase Alternating Lines (Colour video standard)
PDP	Plasma Display Panel
PIP	Picture In Picture
PLL	Phase Locked Loop
POR	Power On Reset / Power Off Reset (depending on context)
QPSK	Quadruple Phase Shift Keying
R	Right
RAM	Random Access Memory
RC5	Remote Control 5 (infrared signal transmission protocol)
RECEI-RC5	Received RC5-code
REF	Reference
RES	Resistor
RGB	Red Green Blue, video signals
SC-1FH	Sandcastle 1FH
SCL	Serial Clock Line of the IC bus
SDA	Serial Data Line of the IC bus
SECAM	SEquential Couleur A Memoire (Colour video standard)
SIF	Second Intermediate frequency
SND	Sound
SOG	Sync On Green
SP_GAIN	Splitter GAIN
SPHsync	Splitter Horizontal Sync
SPVsync	Splitter Vertical Sync
SSP	Small Signal Panel (of the GFL chassis)
STBY	Standby
SW	SoftWare / SubWoofer (depending on context)
SYNC	Synchronisation
SYS	System
Terr	Terrestrial
TP	Testpoint
TRASN	(AQ)
TSD	Terrestrial Sound Decoder (combination of 2CS and NICAM decoder)
TUN	Tuner

TXT	TeleteXT
TXT-KILL	Teletext killer (Signal to disable Teletext)
U-VIDCONTR	U-VideoContrast
VCO	Voltage Controlled Oscillator
VD	Vertical Drive
VGA	Video Graphics Array. In this document, the term VGA is used for all VGA
WE	Write Enable
Xtal	Crystal (Oscillator)
Y/C	Luminance (Y) signal / Chrominance signal (C)
YUV	Combination of colour difference signals